# INDEPENDENT ORBITER ASSESSMENT

## ANALYSIS OF THE ORBITAL MANEUVERING SYSTEM

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MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

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# INDEPENDENT ORBITER ASSESSMENT ANALYSIS OF THE ORBITAL MANEUVERING SYSTEM

12 January 1987

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## 1.0 EXECUTIVE SUMMARY

The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. The IOA approach features a top-down analysis of the hardware to determine failure modes, criticality, and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. This report documents (Appendix C) the independent analysis results for the Orbital Maneuvering System (OMS) hardware.

Although the OMS and aft Reaction Control System (RCS) are housed in the same pod, this report only addresses the OMS. The aft RCS report addresses the analysis of the RCS separately.

The OMS provides the thrust to perform orbit insertion, orbit circularization, orbit transfer, rendezvous, and deorbit. The OMS is housed in two independent pods located one on each side of the tail and consists of the following subsystems:

- Helium Pressurization
- Propellant Storage and Distribution
- Orbital Maneuvering Engine
- Electrical Power Distribution and Control

The IOA analysis process utilized available OMS hardware drawings and schematics for defining hardware assemblies, components, and hardware items. Each level of hardware was evaluated and analyzed for possible failure modes and effects. Criticality was assigned based upon the severity of the effect for each failure mode.

Figure 1 presents a summary of the failure criticalities for each of the four subsystems of the OMS. A summary of the number of failure modes, by criticality, is also presented below with Hardware (HW) criticality first and Functional (F) criticality second.

Figure 1 - OMS OVERVIEW ANALYSIS SUMMARY

| Summary of IOA Failure Modes By Criticality (HW/F) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | 3/3 | TOTAL |
| Number : | 54 | 150 | 9 | 139 | 325 | 274 | 951 |

For each failure mode identified, the criticality and redundancy screens were examined to identify critical items. A summary of Potential Critical Items (PCIs) is presented as follows:

| Summary of IOA Potential Critical Items (HW/F) | | | | | | |
|---|---|---|---|---|---|---|
| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | TOTAL |
| Number : | 54 | 150 | 9 | 44 | 119 | 376 |

Of the 951 failure modes analyzed, 376 were determined to be PCIs.

## 2.0 INTRODUCTION

### 2.1 Purpose

The 51-L Challenger accident prompted the NASA to readdress safety policies, concepts, and rationale being used in the National Space Transportation System (NSTS). The NSTS Office has undertaken the task of reevaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assessment of the Orbiter FMEA/CIL for completeness and technical accuracy.

### 2.2 Scope

The scope of the independent FMEA/CIL assessment activity encompasses those Shuttle Orbiter subsystems and GFE hardware identified in the Space Shuttle Independent FMEA/CIL Assessment Contractor Statement of Work. Each subsystem analysis addresses hardware, functions, internal and external interfaces, and operational requirements for all mission phases.

### 2.3 Analysis Approach

The independent analysis approach is a top-down analysis utilizing available drawings, schematics and documents to breakdown the respective subsystem into components and low-level hardware items. Each hardware item is evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the NASA and Prime Contractor FMEA/CIL reevaluation results. The IOA analysis approach is summarized in the following Steps 1.0 through 3.0. Step 4.0 summarizes the assessment of the NASA and Prime Contractor FMEAs/CILs that is to be performed and documented at a later date.

Step 1.0 Subsystem familiarization
- 1.1 Define subsystem functions
- 1.2 Define subsystem components
- 1.3 Define subsystem specific ground rules and assumptions

Step 2.0 Define subsystem analysis diagram
- 2.1 Define subsystem
- 2.2 Define major assemblies
- 2.3 Develop detailed subsystem representations

Step 3.0 Failure events definition
- 3.1 Construct matrix of failure modes
- 3.2 Document IOA analysis results

Step 4.0 Compare IOA analysis data to NASA FMEA/CIL
- 4.1 Resolve differences
- 4.2 Review in-house
- 4.3 Document assessment issues
- 4.4 Forward findings to Project Manager

## 2.4 OMS Ground Rules and Assumptions

The OMS ground rules and assumptions used in the IOA are defined in Appendix B. The subsystem specific ground rules were defined to provide necessary additions and clarifications to the ground rules and assumptions contained in NSTS 22206.

## 3.0 SUBSYSTEM DESCRIPTION

### 3.1 Design and Function

The Orbital Maneuvering System (Figure 2) provides propulsive thrust for orbit insertion, on-orbit translations, and deorbit. The OMS is housed with the aft RCS in two pods on either side of the tail. The OMS utilizes the hypergolic propellants, monomethyl hydrazine (MMH, fuel) and nitrogen tetroxide (NTO, oxidizer), to provide a total delta V capability of up to 1000 ft/s. The OMS is also used during aborts to dump OMS propellants. Figures 3 and 4 present an overview of the OMS breakdown hierarchy and Figure 5 presents the OMS schematic.

The IOA analysis has defined the OMS as being comprised of the following subsystems.

- Helium Pressurization
- Propellant Storage and Distribution
- Orbital Maneuvering Engine
- Electrical Power Distribution and Control

#### 3.1.1 Helium Pressurization Subsystem

The helium pressurization subsystem is used to maintain pressure in the propellant tanks to feed propellants to the OMS engines. The subsystem consists of a helium tank, two helium pressurization valves, two dual pressure regulator assemblies, two parallel vapor isolation valves, a dual series-parallel check valve assembly, and couplings. A schematic diagram of the OMS helium pressurization subsystem is shown in Figure 6.

##### 3.1.1.a Helium Tanks

Each pod contains one helium supply tank for the purpose of pressurizing the oxidizer and fuel tanks. The helium supply tank is a spherical pressure vessel consisting of a titanium liner with a fiberglass structural overwrap. The maximum diameter of the tank is 40.2 inches producing a usable volume of 17.03 cubic feet. The tank operating pressure ranges from a low of 460 psia to a maximum of 4800 psia.

##### 3.1.1.b Helium Isolation Valves

The helium isolation valves (Figure 7) are continuous-duty solenoid-operated valves. The valves are energized open and spring-loaded closed. The OMS HE PRESS/VAPOR ISOL switches on Panel 08 permit automatic or manual control of the valves. With the switches in the General Purpose Computer (GPC) position, the valves are automatically controlled by the GPC during an engine firing sequence. The valves are controlled

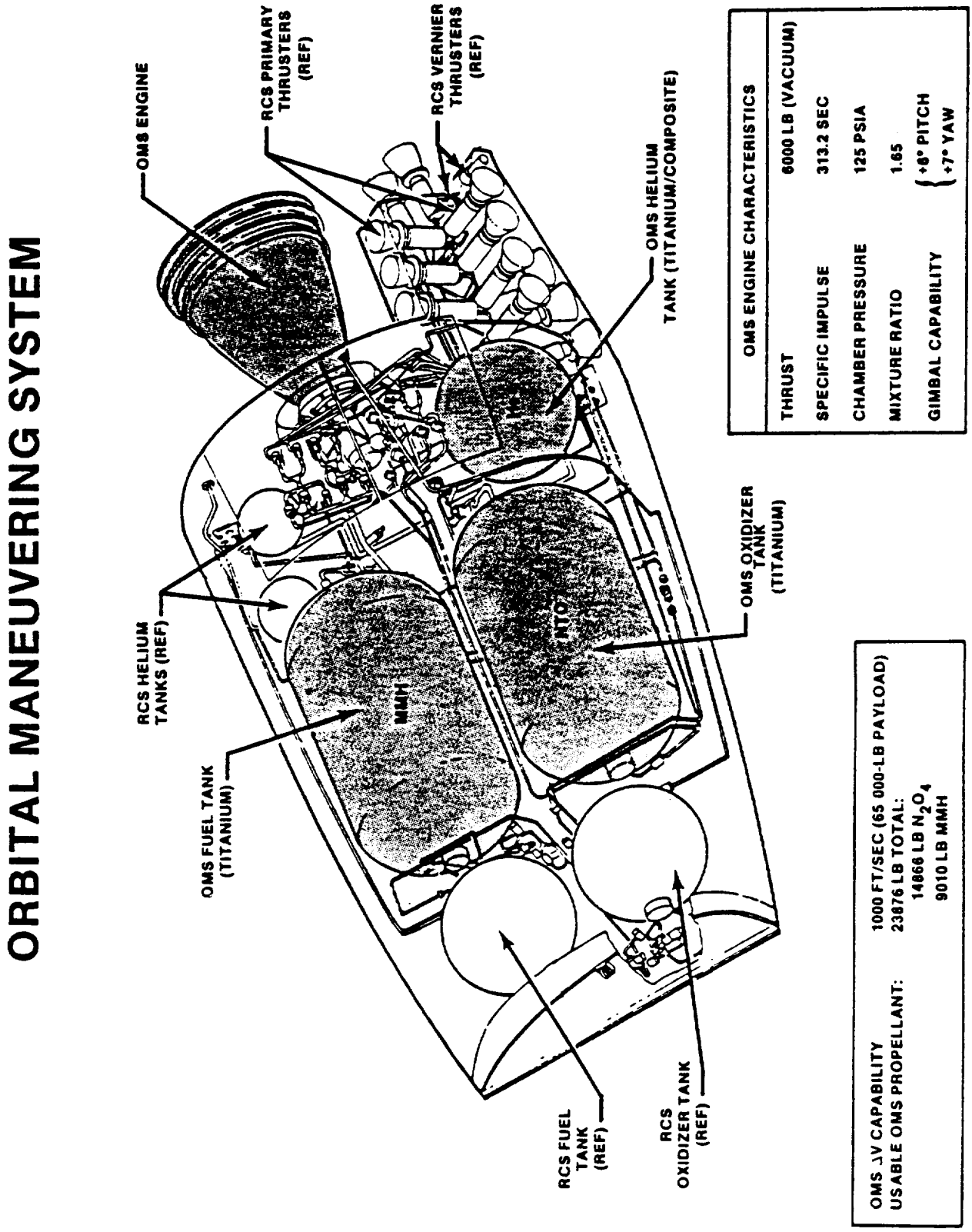


Figure 2 - ORBITAL MANEUVERING SYSTEM OVERVIEW

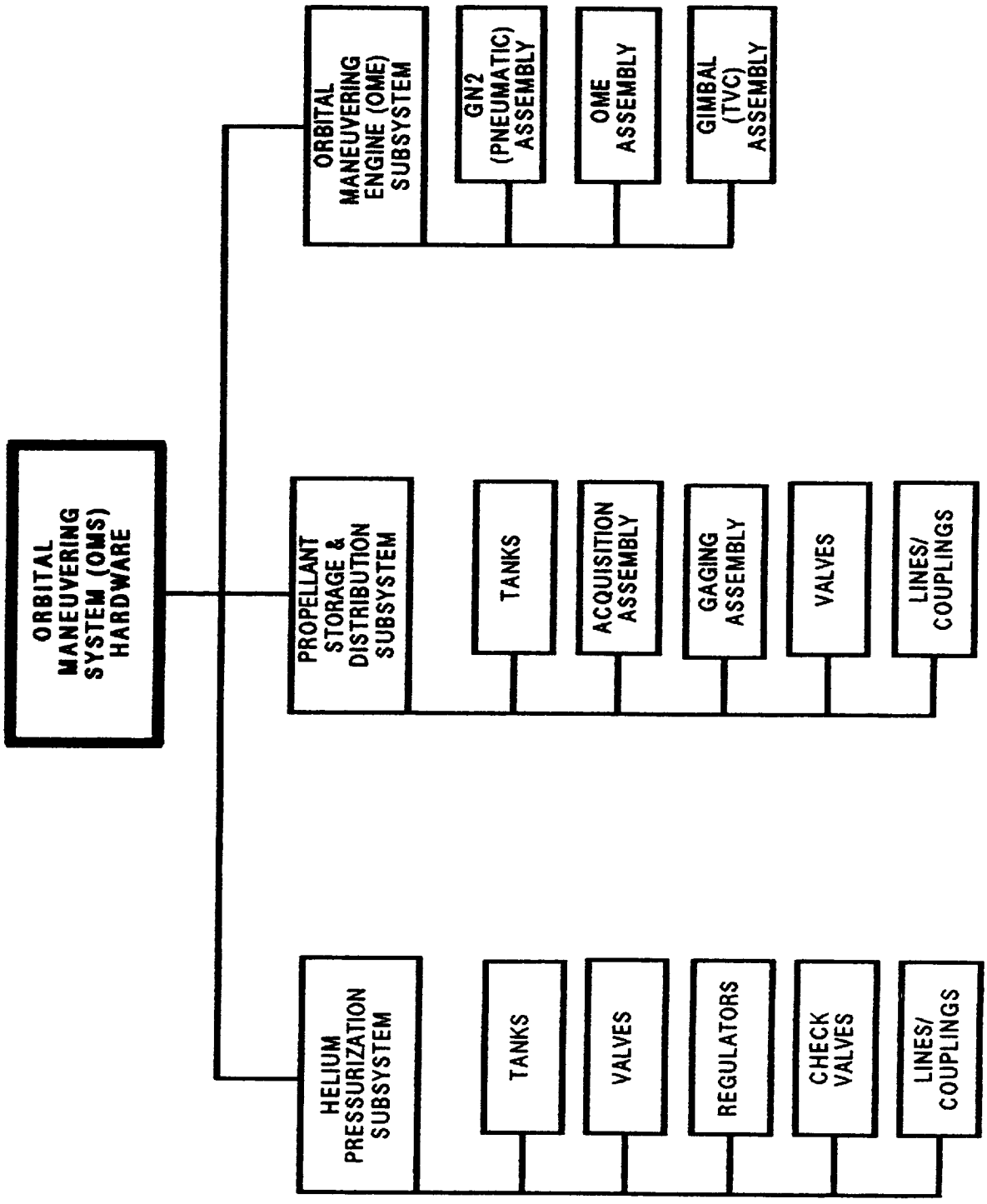


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Figure 3 - OMS HARDWARE BREAKDOWN HIERARCHY

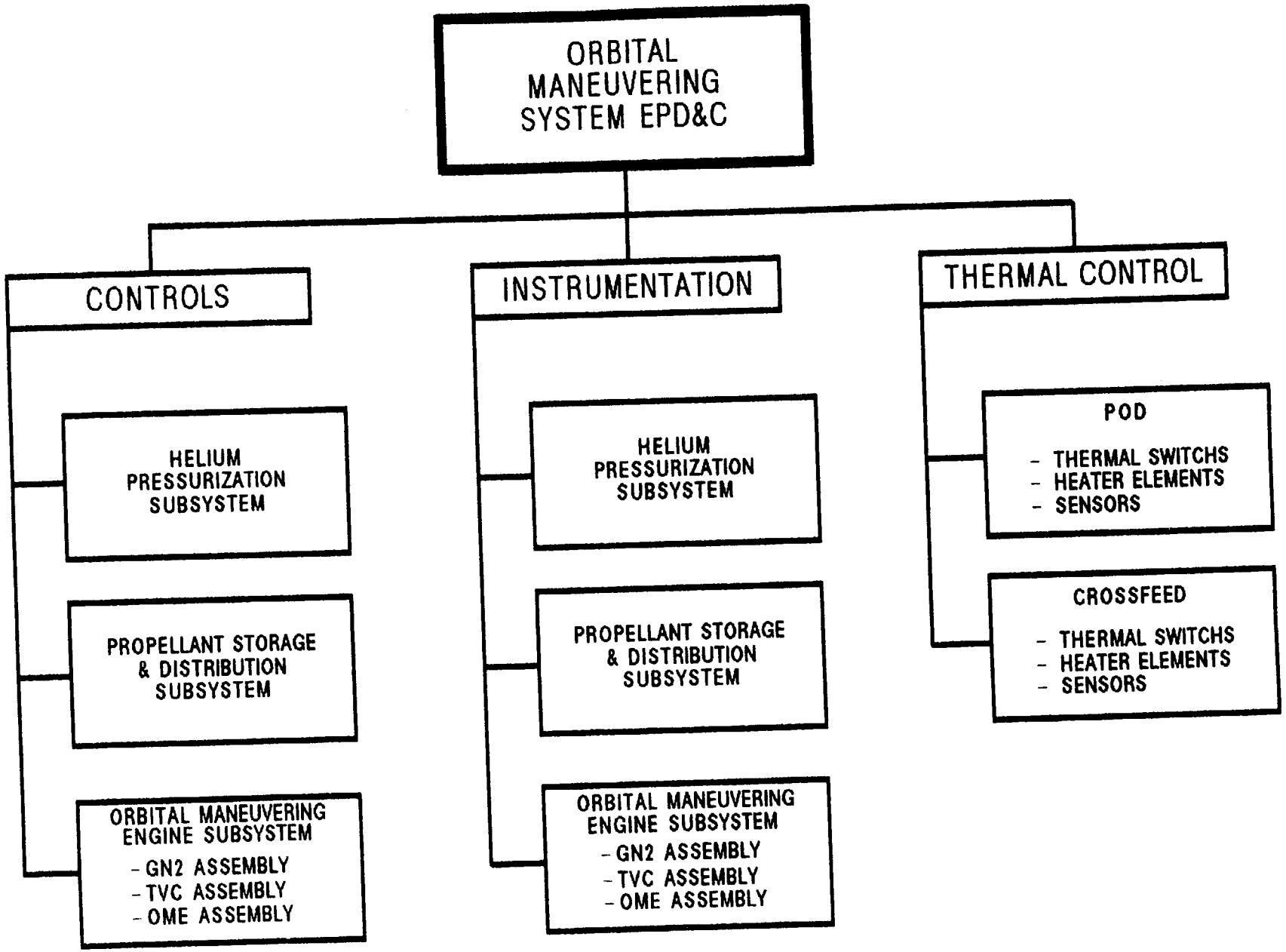


Figure 4 - OMS EPD&C BREAKDOWN HIERARCHY



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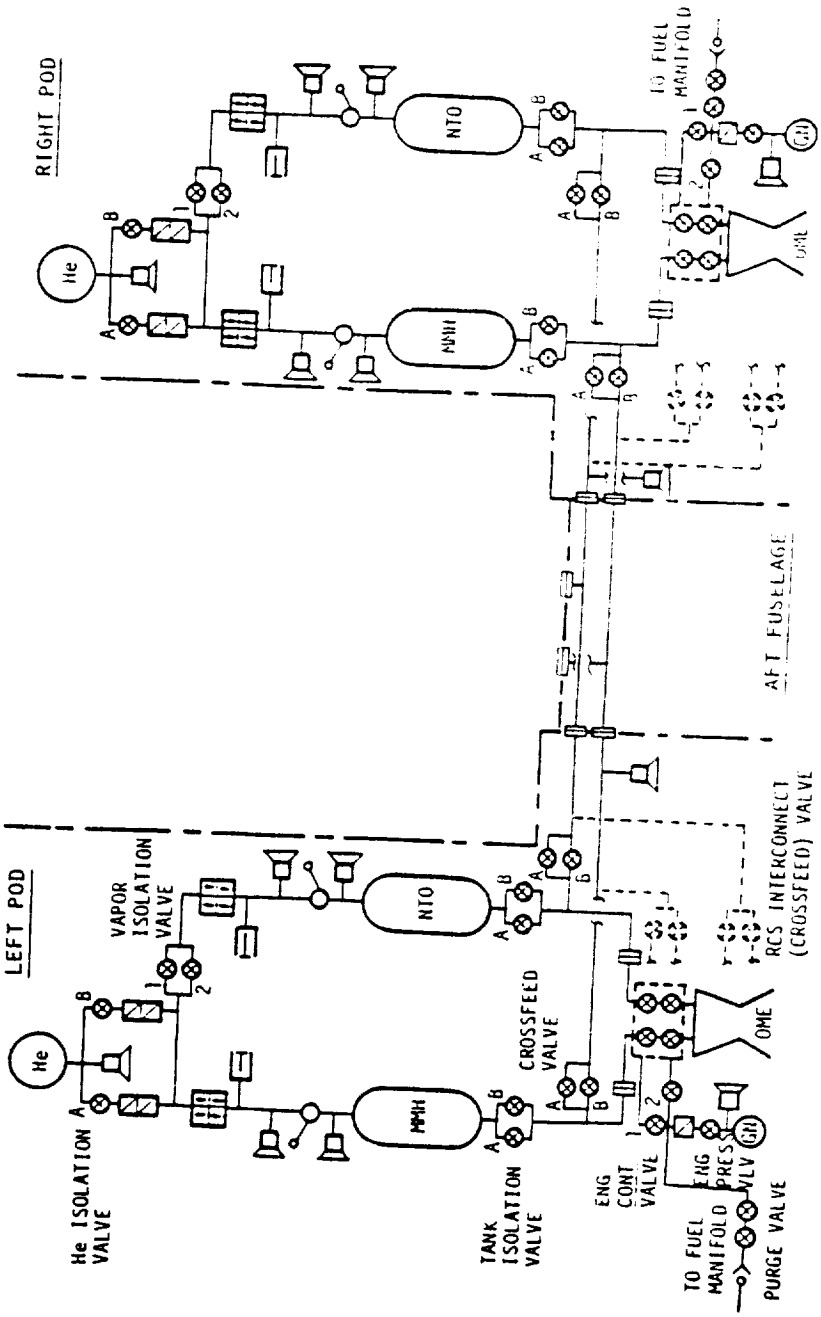



Figure 5 - OMS SCHEMATIC

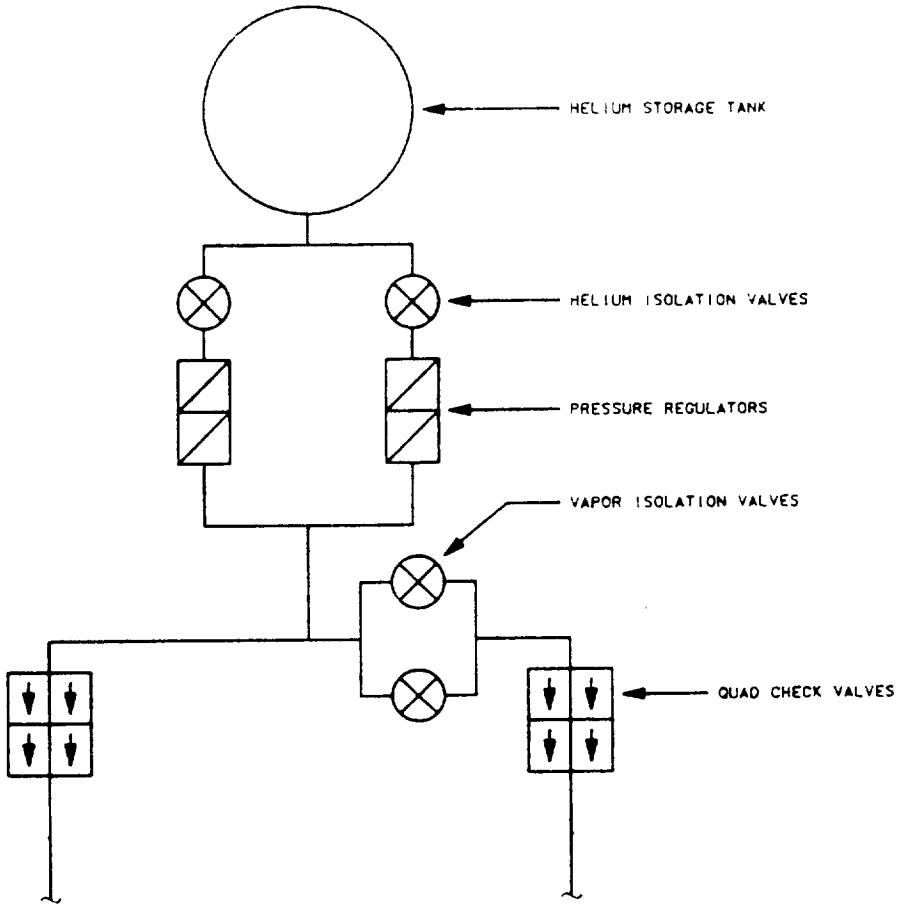



Figure 6 - HELIUM PRESSURIZATION SUBSYSTEM

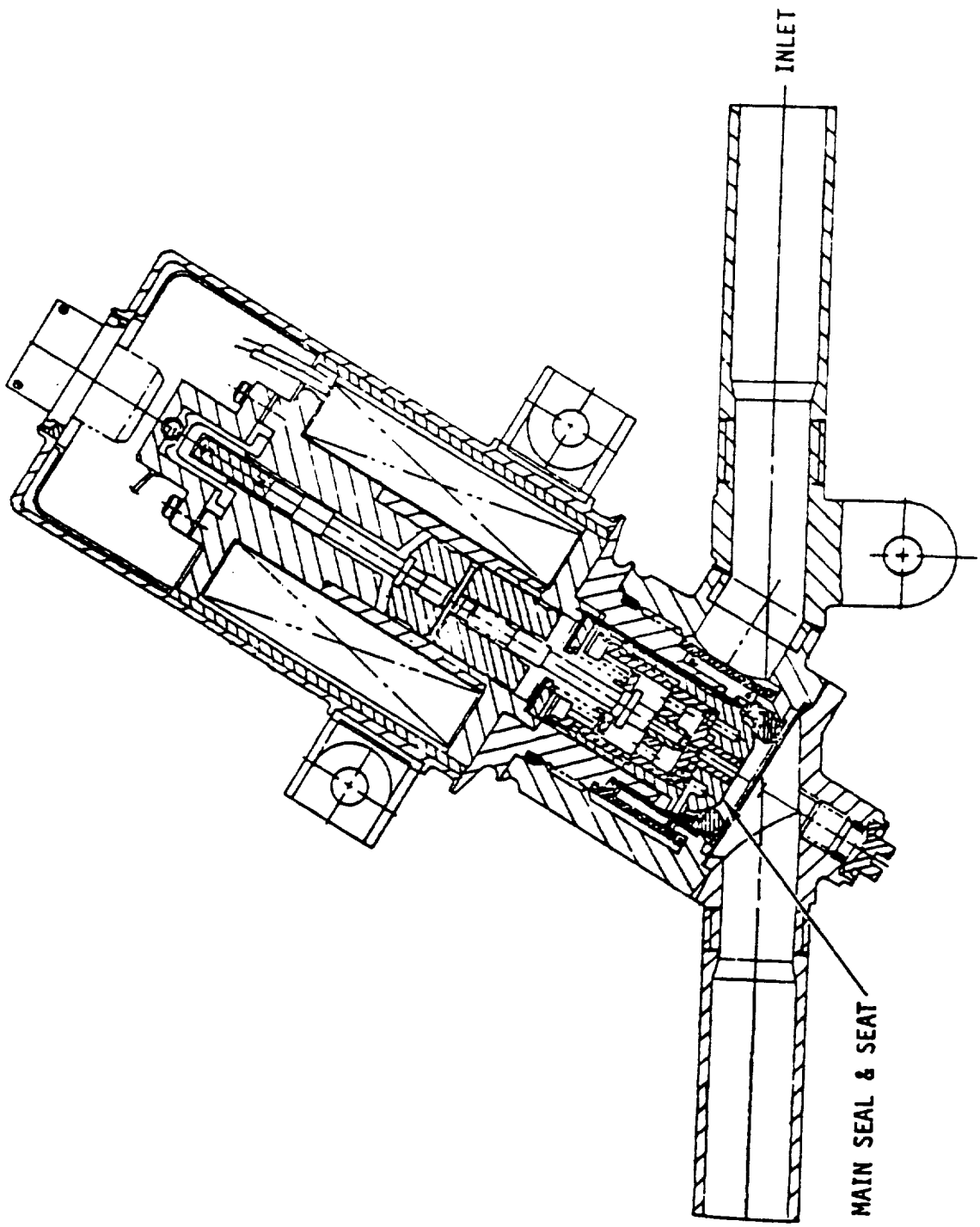



Figure 7 - HELIUM ISOLATION VALVE

manually by placing the switches in the OPEN or CLOSE position. Each valve contains a position feedback that is sent to the GPC for display on the Cathode Ray Tubes (CRTs).

3.1.1.c Helium Pressure Regulator Assemblies

Pressure regulation is accomplished by two pressure-regulating assemblies, one downstream of each helium tank isolation valve. Each assembly contains a primary and secondary regulator in series, and a flow limiter (Figure 8). The primary regulator is normally the controlling regulator. The secondary regulator is normally open and will not become the controlling regulator until the primary regulator allows a higher pressure than normal. The flow limiter allows a minimum of 104 scfm and a maximum of 304 scfm. All regulator pressures are in reference to a bellows assembly that is vented to ambient (Figure 8).

| Outlet Press | Primary | Secondary |
|---|---|---|
| o Normal flow (0 to 265 scfm) | 255+/-4 psig | 262+/-4 psig |
| o High flow (304 scfm) | 245 psig min. | 252 psig min. |
| o Lockup | 264 psig | 271 psig |

3.1.1.d Vapor Isolation Valves

These valves are low-pressure, two-position, two-way, solenoid-operated valves (Figure 9). The valves are energized open and spring-loaded closed. These valves are used to isolate the helium system and fuel tank from the oxidizer tank.

These valves can be commanded manually or by the GPC depending on the position of the HE PRESS/VAPOR ISOL switches on Panel 08. Either of the two (A or B) switches in the OPEN position energize both VAPOR ISOL valves to the open position. With the switches in GPC or CLOSE positions the GPC is allowed to open or close the valves automatically.

3.1.1.e Quad Check Valve

The check valve unit is mounted between the regulators and the propellant tank to pass ullage pressure demand flow downstream and to preclude upstream backflow of helium and propellant vapors, or liquids. Each unit consists of four check valve elements arranged as two parallel assemblies of two series check valve elements (Figure 10). External test/checkout ports allow functional checkout without disassembly of the unit. Filter elements are located at unit's inlet and test ports.

# OMS-RCS REGULATOR

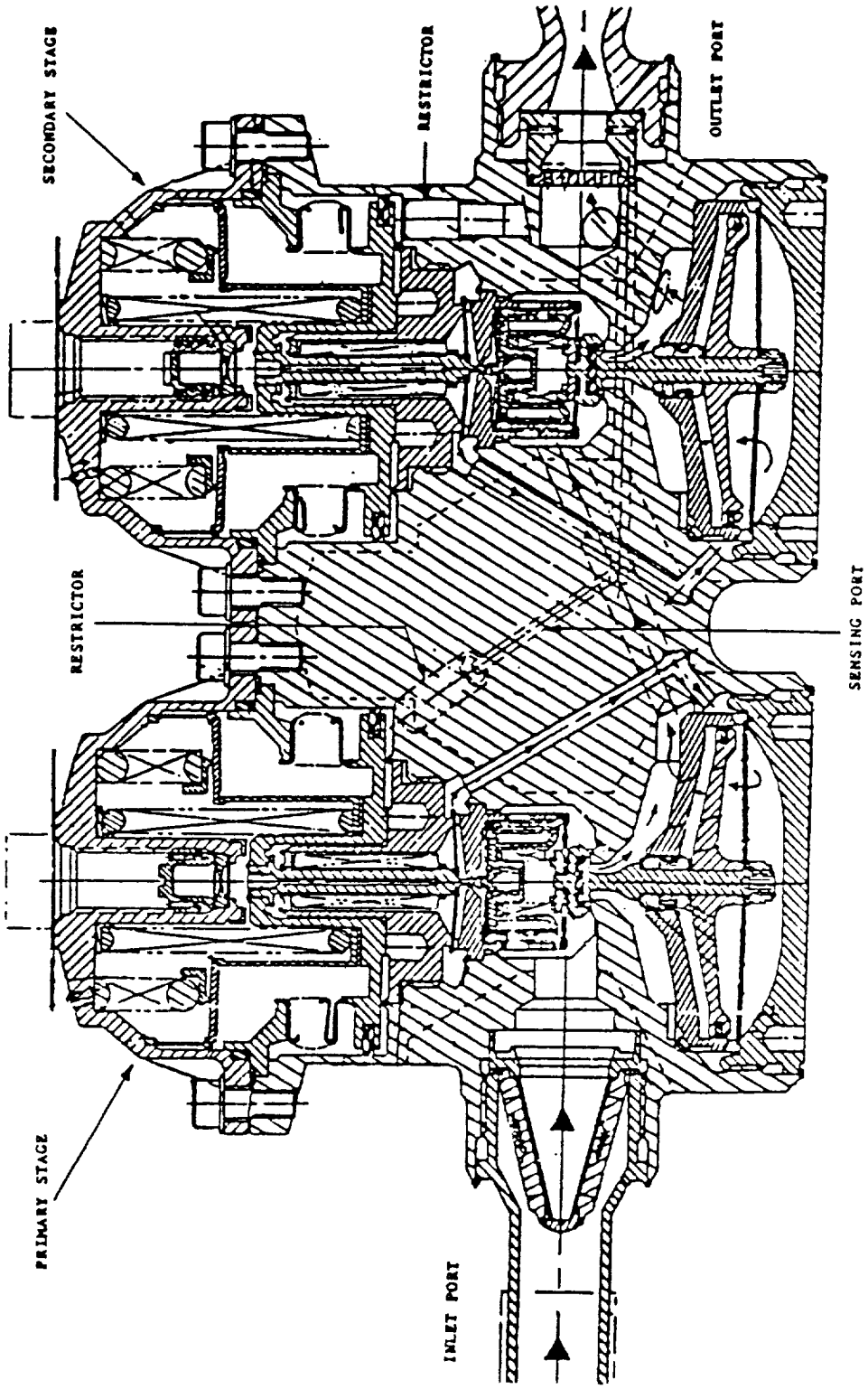



Figure 8 - HELIUM PRESSURE REGULATOR ASSEMBLY

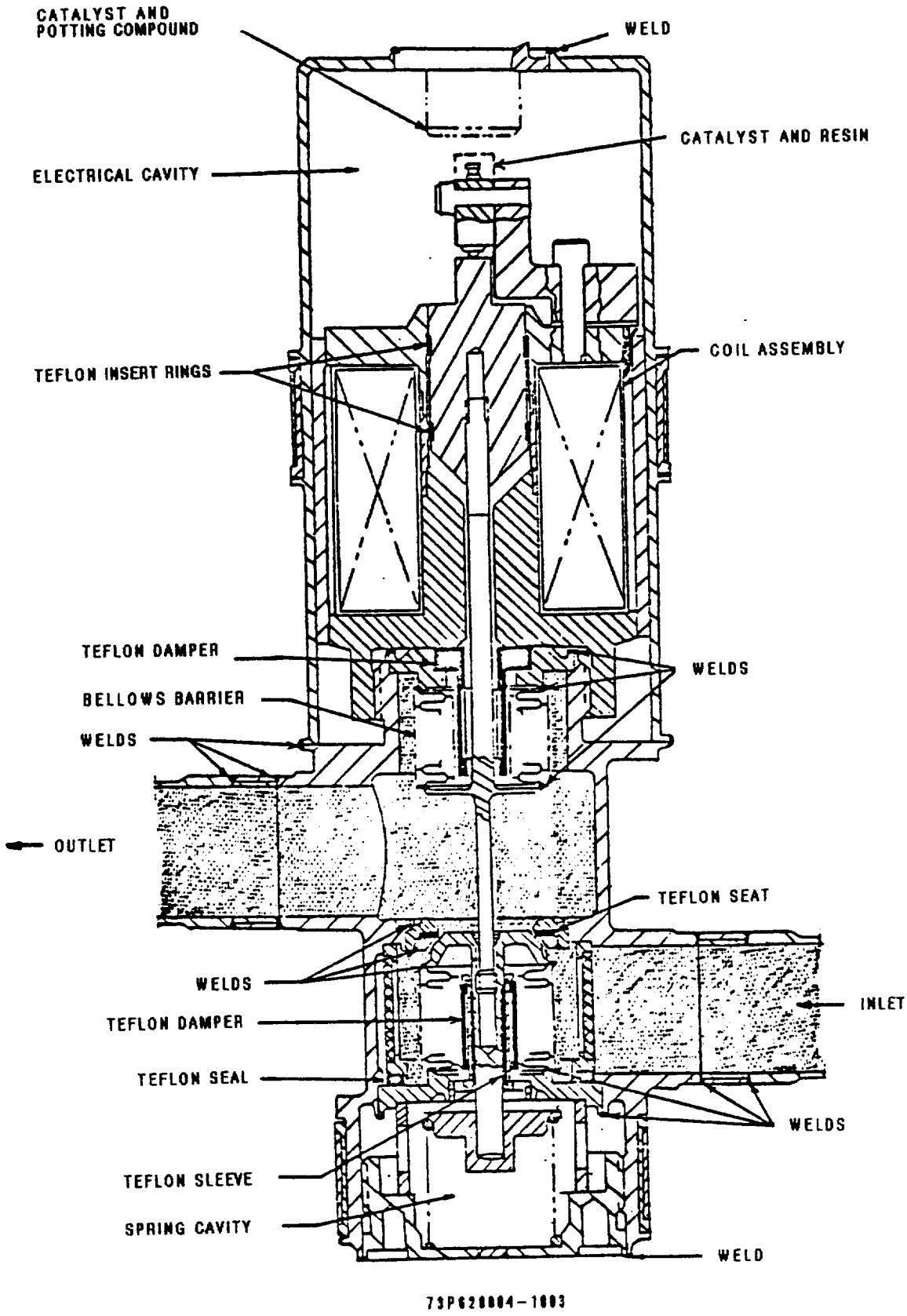



Figure 9 - VAPOR ISOLATION VALVE

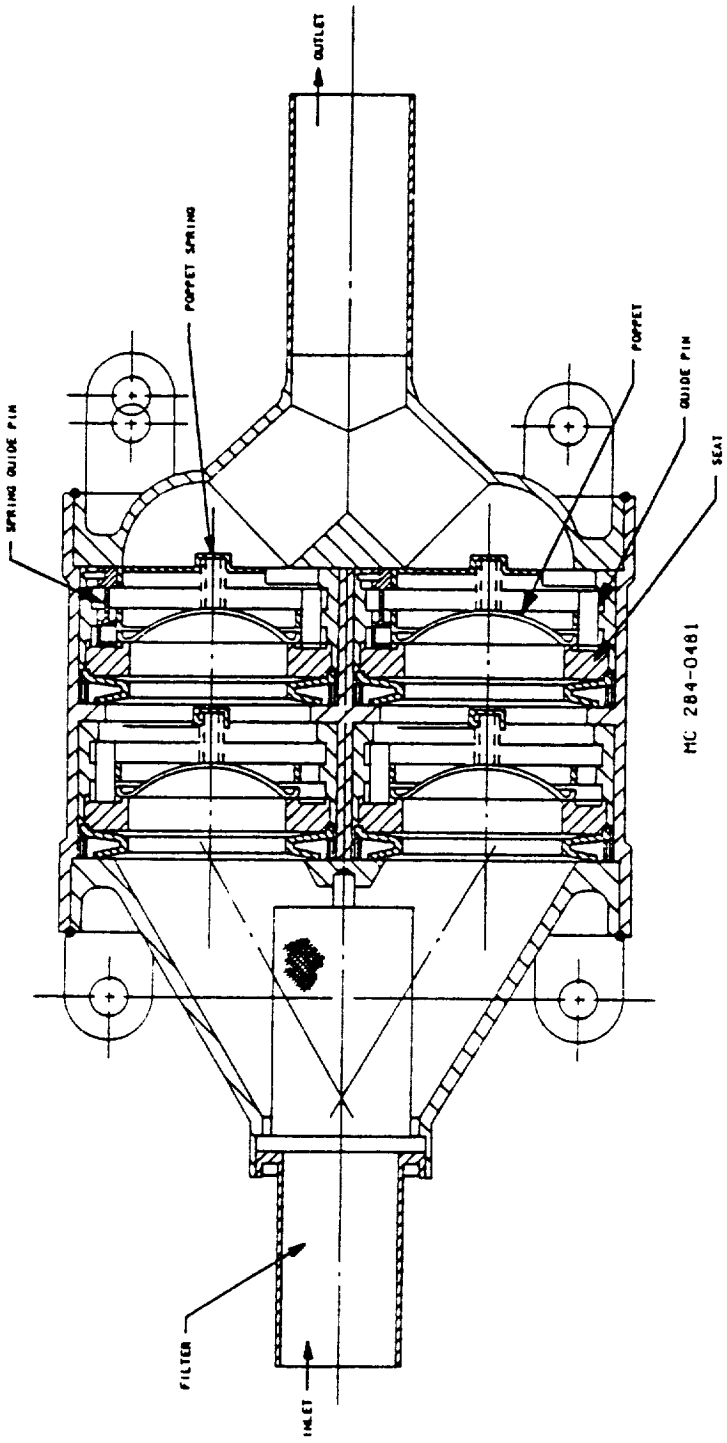



Figure 10 - QUAD CHECK VALVE

### 3.1.2 Propellant Storage and Distribution Subsystem

This subsystem consists of one fuel and one oxidizer tank, tank and crossfeed isolation valves, pressure relief assembly, manual isolation valve, corresponding feedlines, and couplings. The subsystem is capable of several propellant feed configurations. These include nominal OMS feed, OMS crossfeed, OMS/RCS interconnect and mixed crossfeed. The OMS engines can be operated individually using propellant from either pod. All valves can be controlled manually by switches located in the forward flight deck, with GPC software sequences or GPC memory write procedures. A schematic of the OMS propellant storage and distribution subsystem is shown in Figure 11.

#### 3.1.2.a Propellant Tanks

The propellant supply is contained in domed, cylindrical titanium tanks within the OMS pod. The forward and aft sections of each tank has a fluid volume of 63 and 27 cubic feet, respectively.

The tank operating pressure is 250 psia with a maximum operating pressure of 313 psia. The propellant tanks contain the propellant gaging and the propellant acquisition and retention assemblies.

#### 3.1.2.a.1 Propellant Acquisition and Retention Assembly

Each propellant tank is divided into two compartments: forward and aft. The propellant acquisition and retention assembly (Figure 12) is located in the aft compartment and consists of a communication screen and a trap reservoir.

The communication screen allows propellant flow while preventing helium gas from crossing through the screen, and retains propellant in the aft compartment during zero g.

The trap reservoir contains four stub galleries and a collector manifold. The stub galleries acquire wallbound propellant at OMS startup. The stub galleries also have screens which allow propellant flow while preventing gas ingestion. The collector manifold is connected to the four stub galleries and contains a gas arrester screen to further prevent gas ingestion.

#### 3.1.2.a.2 OMS Gaging

A capacitance system is used to measure the amount of propellant in the OMS tanks. The system consists of forward and aft capacitance probes and an electronic

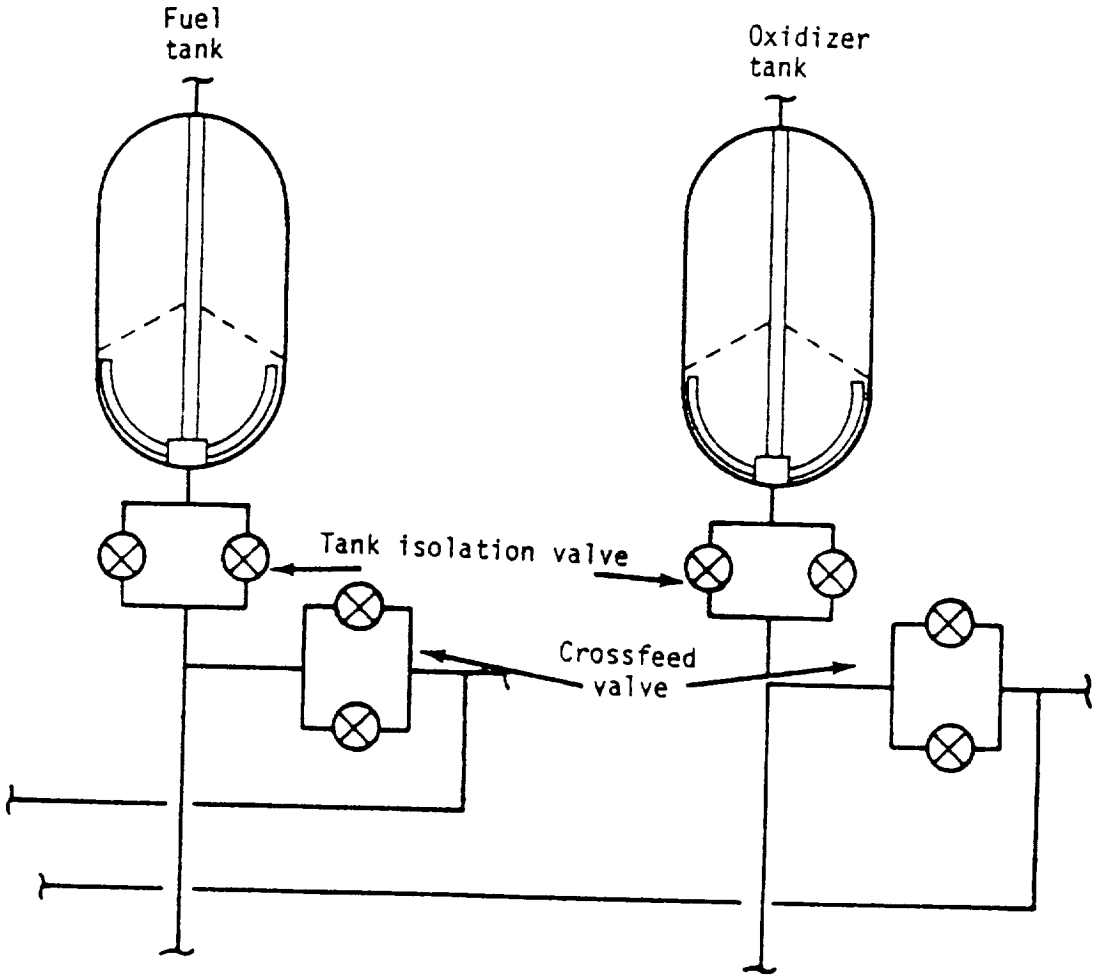



Figure 11 - PROPELLANT STORAGE AND DISTRIBUTION SUBSYSTEM

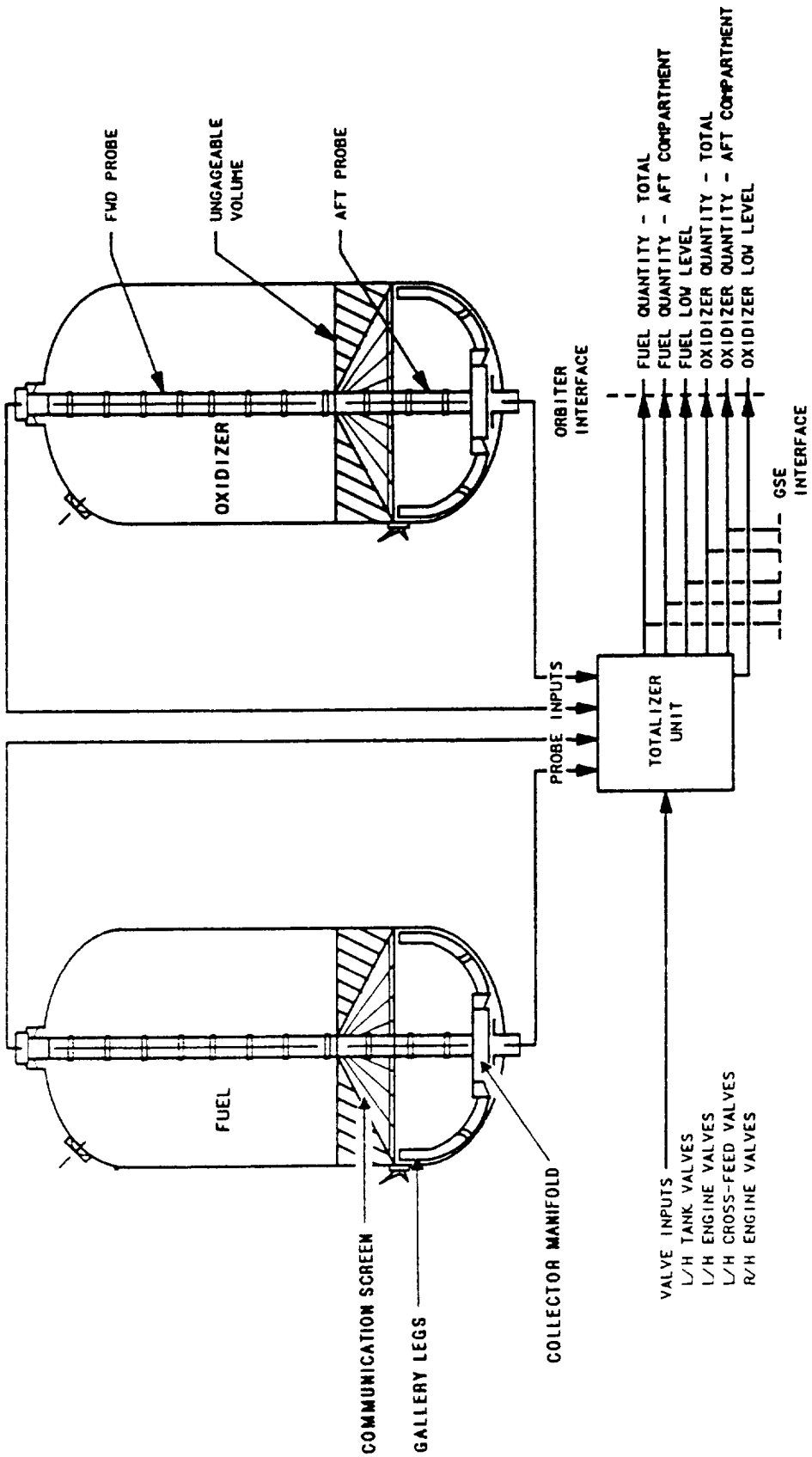



Figure 12 - PROPELLANT TANKS WITH ASSEMBLIES

totalizer. Propellant quantities are updated only during OMS burns. Figure 12 shows an overview of the OMS gaging system.

The design of the probes uses the electrical properties of the propellant to measure the height of propellant between two concentric tubes. Fuel is a conductor and forms one capacitor plate; the other plate is the inner tube of the probe, which is a glass tube with a metalized silver coating on the inside. The oxidizer is dielectric, and the capacitor plates are the outer and inner nickel tubes of the probe.

An ungageable region exists between the top of the bulkhead screen and the bottom of the forward probe. This represents the tank quantity between 30 percent and 44 percent. An integration routine using burn time and a preset flowrate is used by the totalizer to update the quantity of this region.

Forward Probe - The forward probe measures the propellant above the bulkhead screen. The forward probe consists of the concentric capacitance probes, probe electronics, helium pressurization gas inlet, and the gas inlet diffuser screen.

Aft Probe - The aft probe measures the propellant below the bulkhead screen. The aft probe consists of the concentric capacitance probes and the probe electronics.

Totalizer - The totalizer receives inputs from the forward probe, aft probe, tank isolation valves, crossfeed valves, engine control valves and outputs total and aft quantities for each tank. A block diagram of the totalizer logic flow is shown in Figure 12.

An OMS to RCS gaging program calculates the OMS propellant used by the aft RCS from each pod during interconnect operations.

### 3.1.2.b Pressure Relief Valves

The pressure relief valve is located upstream of the propellant tanks but downstream of the helium quad check valves. The pressure relief valve (Figure 13) consists of a relief valve, burst diaphragm, and a filter.

In the event excessive helium and/or propellant vapor pressure ruptures the burst diaphragm, the relief valve opens and vents the system. The relief valve will close and reseal after the excessive pressure has returned to the operating level.

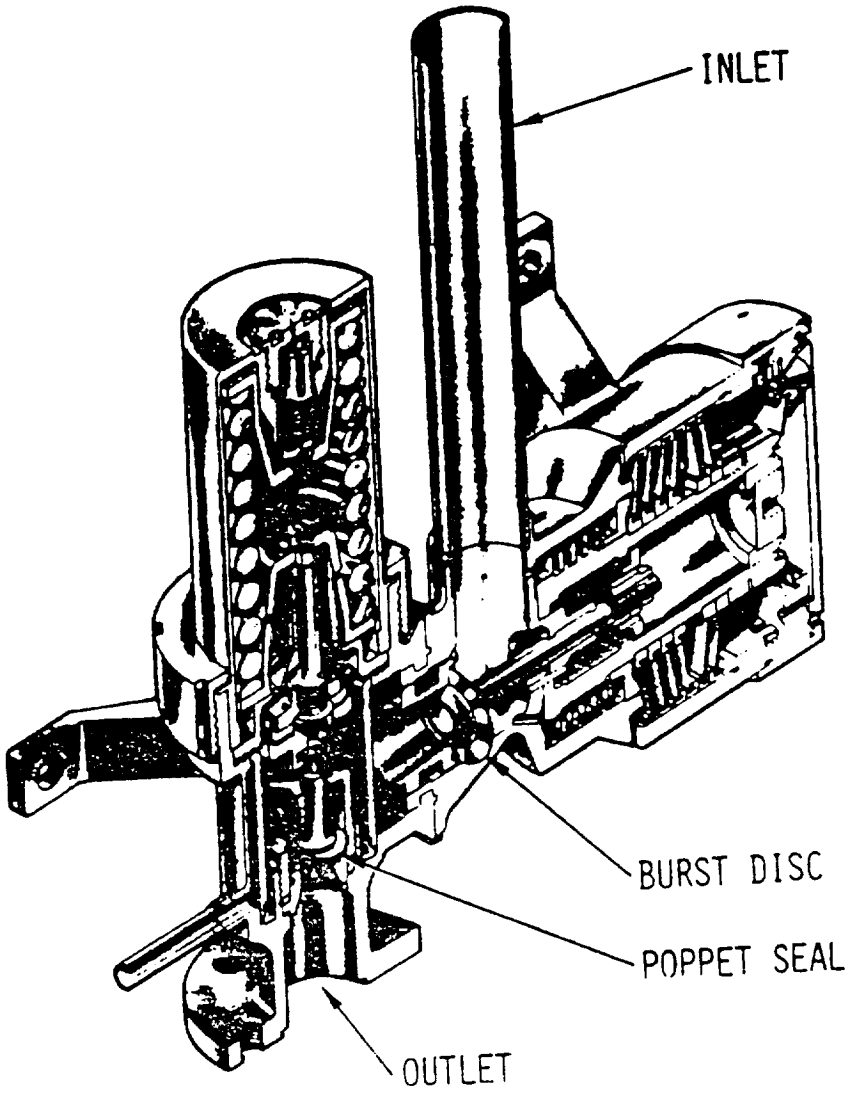



Figure 13 - PRESSURE RELIEF VALVE

The burst diaphragm provides a more positive seal of helium than a relief valve. The filter prevents any fragments from the nonfragmentation type diaphragm from entering the relief valve seat.

The diaphragm rupture pressure is 305+/-8 psig. The relief valve will open at a minimum of 291 psig and a maximum of 307 psig. The minimum reseat pressure is 285 psig.

### 3.1.2.c Propellant Feed and Interconnect Lines

The propellant feed lines connect each of the left and right pod's propellant tanks to their corresponding engine. The crossfeed lines are connected to the feed lines to allow the crossfeeding of propellant from one pod's propellant tanks to the other pod's engine. Furthermore, the OMS propellant interconnect lines are connected to the RCS crossfeed lines to feed propellant from either OMS pod's tanks to the RCS aft jets.

### 3.1.2.d Tank Isolation and Crossfeed Valves

These valves are ac motor operated with bistable ball type flow control (Figure 14). They serve to isolate the propellant tank from the feed and crossfeed lines. The TANK ISOLATION and the CROSSFEED switches on Panel 08 permit GPC or manual control of the valves. With the switch in the GPC position, the valves can be automatically controlled by the computers. The valves are controlled manually by placing the switches in the OPEN position allowing an electric signal to provide power to the ac motors to open the valves. With the switches in the CLOSE position a signal is sent to allow power to the ac motor to drive the valves closed.

The ac motor valve operates on 115 volt ac, 400 Hz three-phase power but will operate with only two phases if required. The microswitch position indicators utilize 28 volt dc power to generate the open and close position discretes. The valves are activated by logic circuits in the Orbiter Motor Control Assemblies (MCA). Valves may be moved by manual or GPC command.

A valve will operate when ac power to the motor is turned on by a set of relays in the MCA logic. The high rpm input of the ac motor is stepped down by the planetary gears to turn a semicircular gear sector (not shown). The gear sector in turn drives the brake/clutch (rocker assembly) on the top of the valve assembly. The brake/clutch turns a torsion rod, which is connected to an actuator finger. The actuator finger is the device that moves the valve ball.

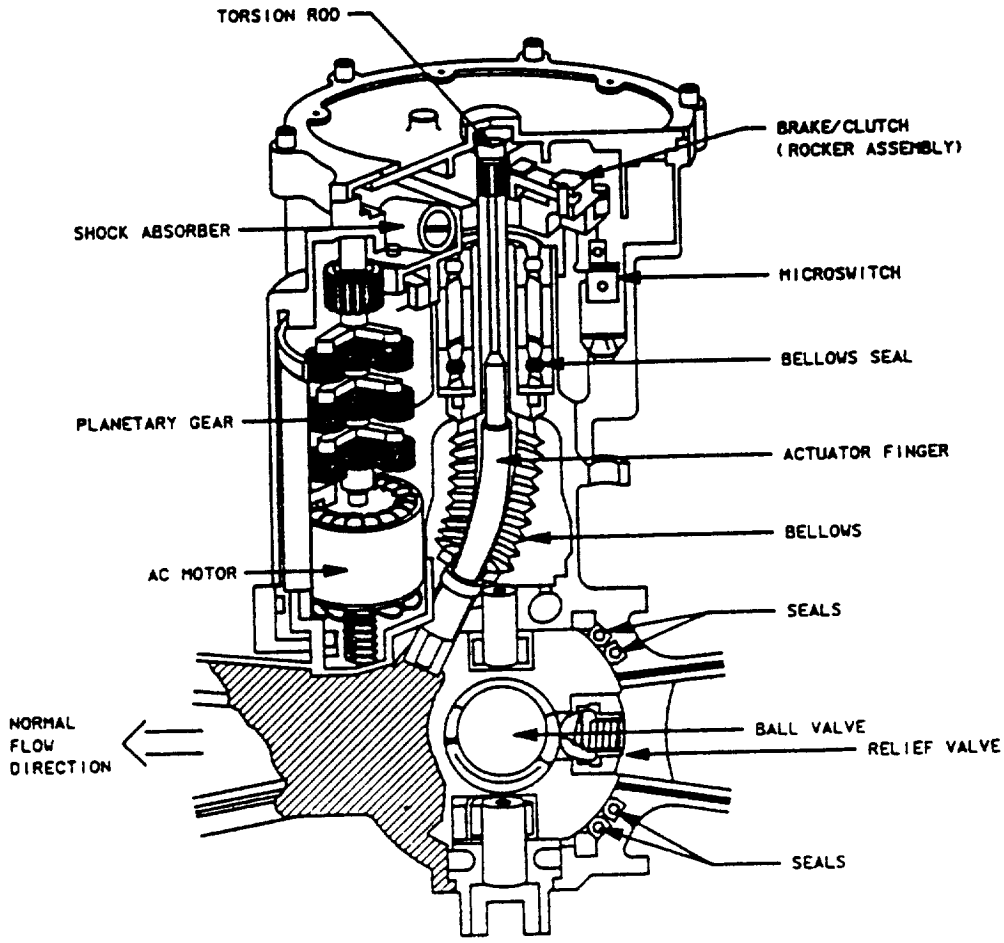



Figure 14 - TANK AND CROSSFEED ISOLATION VALVE

When the valve drives to the command position, cams on the bottom of the semicircular gear sector activate microswitch position indicators. These discretes are fed back to the MCA logic to remove power from the valve within 50 msec after reaching the commanded position.

The actuation time for a valve is from 1.1 to 1.3 seconds for three-phase operation and approximately 1.5 seconds for two-phase operation. Propellant flow through the valve is established within 0.5 seconds of the first valve motion.

### 3.1.2.e Manual Isolation Valve

The ground manual isolation valve is used to isolate the propellant tank from the helium pressurization subsystem for ground operations. The nonpowered valve can only be opened with a special tool which cannot be detached with the valve in the closed position. Open during all flight phases, the valve has redundant seals to external leak paths (Figure 15).

## 3.1.3 Orbital Maneuvering Engine Subsystem

The OMS engine is a pressure fed, hypergolic reacting bipropellant, regenerative-cooled, fixed thrust rocket engine. The engine can be gimbaled to provide thrust vector control (TVC). Major assemblies are the GN2 (pneumatic), bipropellant ball valves, injector, combustion chamber, nozzle extension, engine purge valve, fuel/oxidizer lines, couplings, and gimbal system (Figure 16). Two OMS engines are installed on the Orbiter vehicle, one per pod.

Engine operation is controlled via GPC software sequences. Ignition is commanded only after specific crew system configurations (switch positions and CRT inputs) have been completed. However, shutdown can be commanded manually at any time during a burn. Crew/flight controller insight into engine operation is via pressure, temperature, and valve position instrumentation provided with the engine.

### 3.1.3.a Gaseous Nitrogen (GN2) Assembly

The purpose of the OMS GN2 (pneumatic) assembly is to store pressurized nitrogen gas and supply on command regulated GN2 to actuate the bipropellant ball valves and purge the fuel side of the injector assembly. Also, sufficient regulated GN2 is stored in an accumulator for a minimum of one engine start.

The GN2 assembly consists of a fill and vent valve, storage tank, engine pressurization valve, check valve, pressure regulator, relief valve, accumulator, and associated instrumentation (Figures 17 and 18).

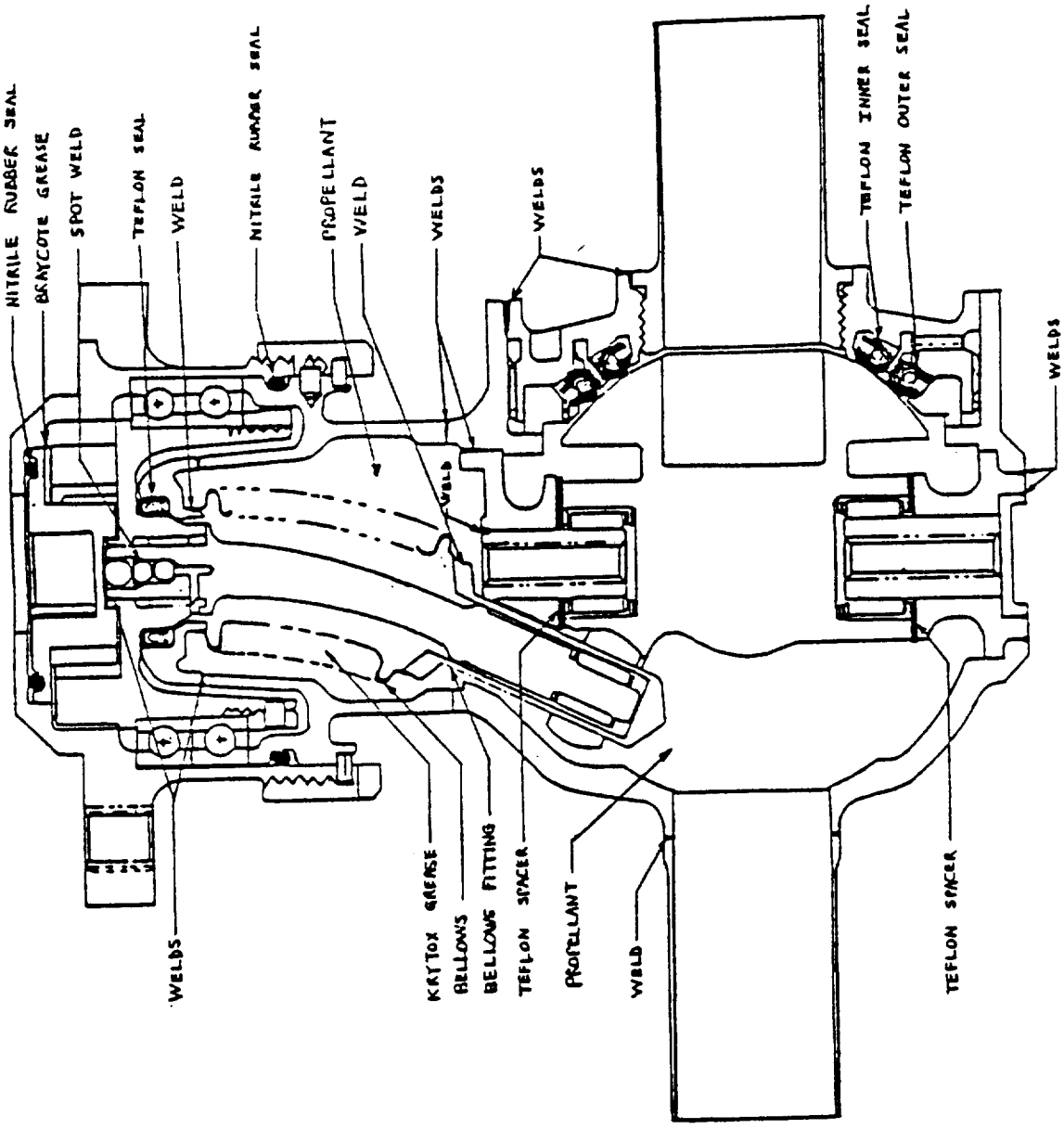



Figure 15 - MANUAL ISOLATION VALVE

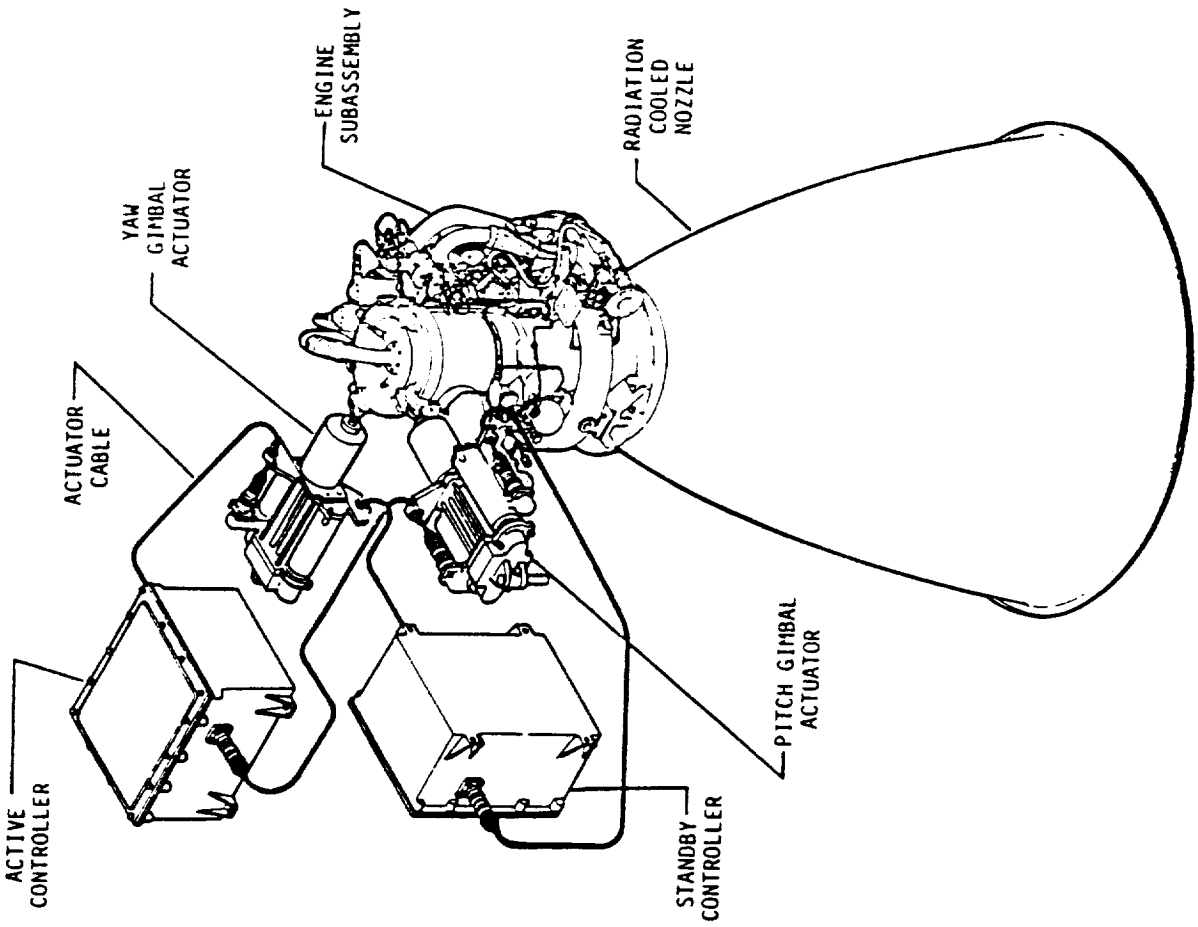



Figure 16 - ORBITAL MANEUVERING ENGINE SUBSYSTEM

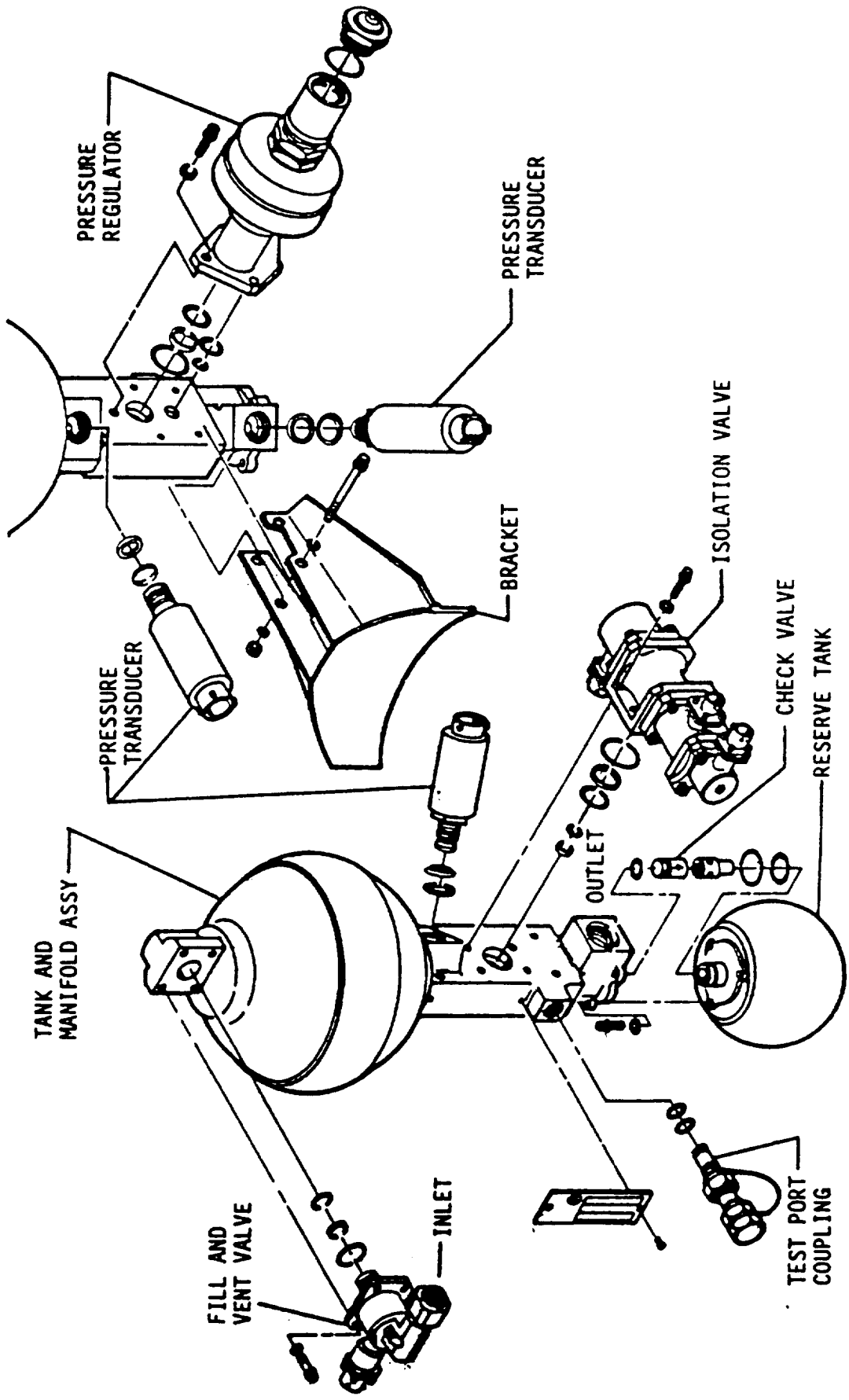



Figure 17 - GN2 PNEUMATIC PACK ASSEMBLY

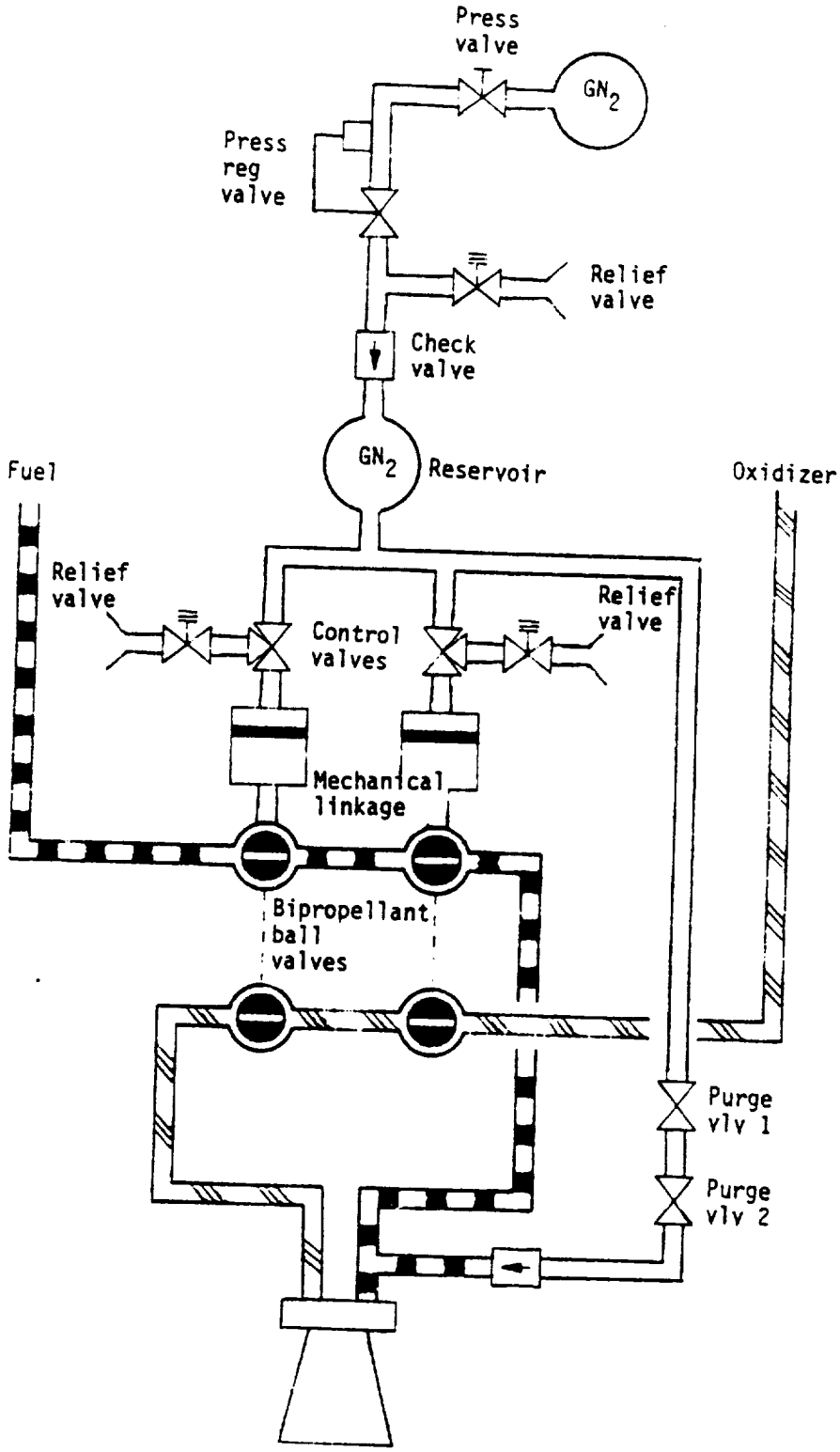



Figure 18 - GN2 PRESSURIZATION ASSEMBLY SCHEMATIC

### 3.1.3.a.1 Fill and Vent Valve

The fill and vent valve is a two-way, high-pressure coaxial, single solenoid-operated valve (Figure 19). The valve is used only during ground operations to pressurize or vent the GN2 (pneumatic) assembly. There is no electrical power to the solenoid coil during flight. The valve is designed to fail closed via an internal spring. During fill operations the GN2 is filtered through sintered stainless steel wire filters at the inlet and outlet ports. The valve is bolted directly to the GN2 storage tank. There is no instrumentation on this valve.

### 3.1.3.a.2 Storage Tank

The GN2 storage tank is a fracture-critical component. The tank is manufactured from titanium bar stock in two halves, then welded together. One half incorporates the mounting flange for the fill and vent valve. The second half incorporates the mounting flanges and flow passages for the remaining GN2 components. Initial GN2 loading is 0.43 pounds at 3000 psia and 70 degrees F. Nominally, this loading will supply 17 engine start/purge cycles. Instrumentation consists of two strain gage-type pressure transducers, which can be monitored on CRT display "GNC SYS SUMM 2" and the cockpit dedicated meter "OMS PRESS N2/He" on Panel F7. The tank pressure transducer designated P1 is hardwired to this meter. The transducer outputs are limit sensed in the PASS (OPS 2 and 8) and the BFS (OPS 1, 3, and 6) and will trigger an SM alarm (class 3) if one or both go out of limits. These pressures are included in the Guidance, Navigation, and Control (GNC) downlist for ground monitoring.

### 3.1.3.a.3 Engine Pressurization Valve

The OMS engine pressurization (PRESS) valve is a two-way, high-pressure, dual solenoid-operated shutoff valve. The purpose of this valve is to start and stop the flow of GN2 in the pneumatic actuation system. The valve will open with the application of electrical power (23-28 V dc) and only one solenoid is required for nominal operation. With the loss of electrical power the valve is designed to fail closed via an internal spring. During GN2 flow conditions, the gas is filtered through a sintered stainless steel wire filter at the inlet port. Instrumentation consists of a leaf spring switch, which is activated by a push rod integral to the valve poppet assembly. Closure of the switch completes an electrical circuit to indicate an open valve. Valve open/closed status can be monitored

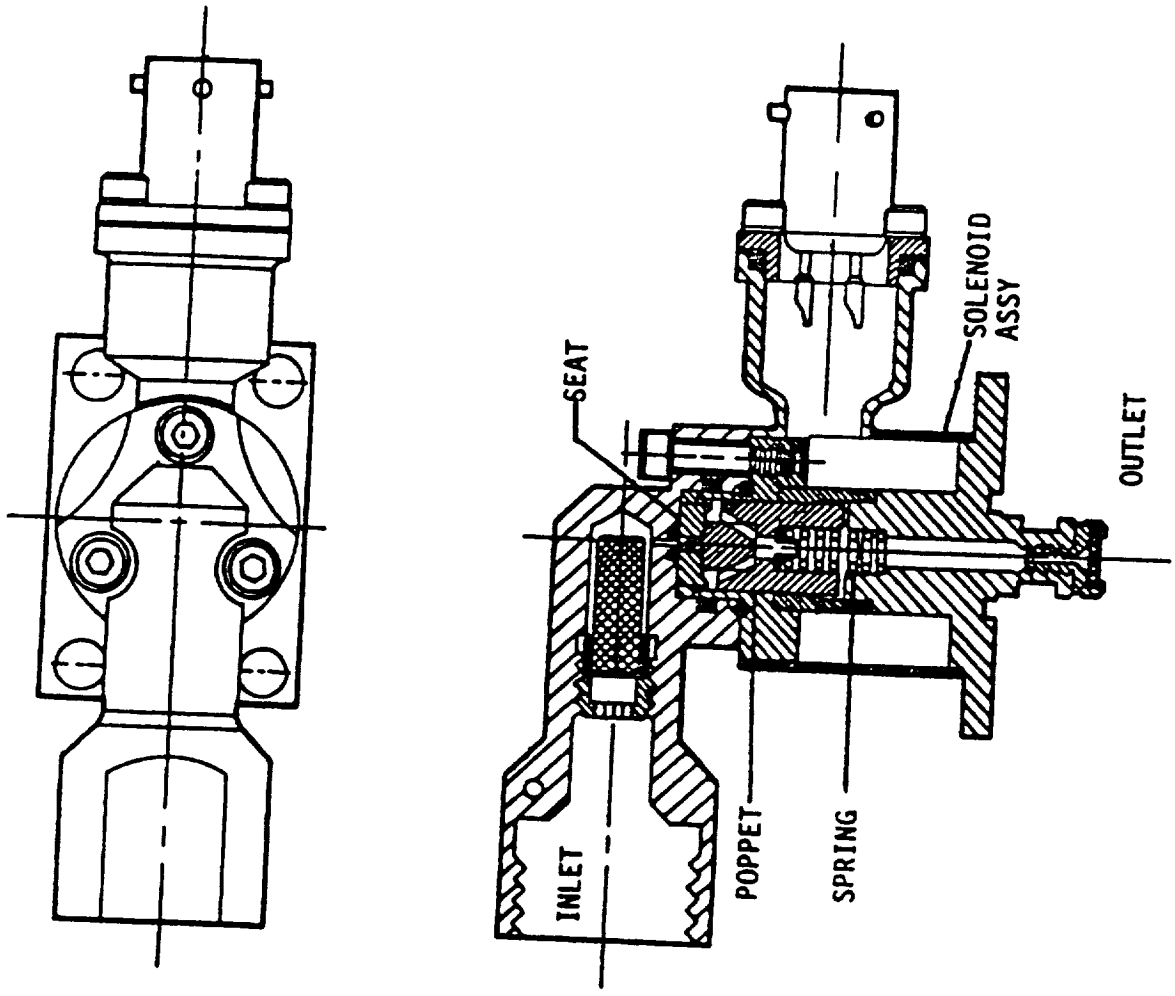



Figure 19 - GN2 FILL AND VENT VALVE

on CRT display "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and BFS (OPS 1, 3, and 6). The switch's open/closed status is in the GNC downlist and is available for ground monitoring.

The engine pressurization valve is not controlled by the GPC software. Activation of the valve can only be accomplished by manual control of the "OMS ENG" switch on cockpit Panel C3. Placing the "OMS ENG" switch in the "ARM/PRESS" position will open the "ENG PRESS VLV" and allow GPC software to activate the engine control valves for a burn, open the purge valves at burn completion, and repressurize the GN2 accumulator. With the "OMS ENG" switch in the "ARM" position the software will inhibit opening of the purge valves.

3.1.3.a.4 Pressure Regulator/Relief Valve

The GN2 pressure regulator is a modulating, pressure reducing, direct acting pressure-operated mechanical regulator with an integral pressure operated relief valve. The purpose of the regulator is to reduce high upstream GN2 tank pressure (470 to 3000 psig) to the downstream nominal on-orbit ball valve actuator pressure (310 +/- 10 psig). If downstream pressure does increase, (at 360 psig maximum) the regulator will lock up stopping GN2 back-flow. If the regulator fails open or if downstream pressure rises to 450 psig, the integral relief valve will open to vent GN2. At 400 psig the relief valve will reseat to stop venting. During active GN2 flow the gas is filtered through a sintered stainless steel wire filter at the inlet port. There is no instrumentation on this device. However, actual operation can be inferred from the GN2 storage tank and reservoir outlet pressures. The operating pressure levels of the regulator and relief valve may be mechanically reset.

3.1.3.a.5 Check Valve

The GN2 check valve is a one-way flow, cartridge type valve. The purpose of this valve is to prevent GN2 accumulator back flow from occurring if a leak occurs upstream of the check valve. The valve is held close by a mechanical spring and will open with a pressure 6 psig above the downstream level. Reseat pressure is 1 psig delta across the valve. There is no instrumentation associated with this component.

3.1.3.a.6 GN2 Reservoir

The GN2 reservoir (accumulator) is a fracture-critical component manufactured from titanium bar stock. Manufacturing is done in two halves, which are welded

together. The assembly is then bolted to a mounting flange, which is part of the GN2 storage tank. The reservoir nominally holds about 0.0008 pounds of GN2 at 320 psia and 70 degrees F. This quantity is enough to guarantee a minimum of one engine start. Instrumentation consists of one strain gage-type pressure transducer located between the check valve and the reservoir inlet/outlet. This measurement is titled "GN2 REG P", and is monitored on the CRT display "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and BFS (OPS 1, 3, and 6). This pressure is also limit sensed and will trigger an SM alert (class 3) if it goes out of limits. GNC downlist of this pressure, for ground monitoring, is also available.

3.1.3.a.7 Engine Control Valve

The engine control valve is a three-way, two-position, dual solenoid-operated valve (Figure 20). The valve is normally closed to the bipropellant valve pneumatic actuator inlet port. Upon receipt of electrical power (23-32 V dc) redundant solenoids in tandem will open the valve allowing the flow of pressure regulated GN2 into the actuator, deflecting a piston and opening the bipropellant valves. Removal of electric power will close the valve. Closure is accomplished mechanically by an internal spring. Under flow conditions the GN2 is filtered through a sintered stainless steel wire filter located in the inlet port. The valve is bolted to an integral attach flange on the actuator assembly. Purge of pressurized GN2 from the valve and the actuator cylinder is done during the close cycle. Instrumentation for the control valve is a leaf spring switch. Activation is by a push rod, which is an integral part of the valve poppet assembly. Design and operation of the switch is identical to the "ENG PRESS VLV". However, this switch is not monitored in the cockpit but is in the OI downlist for ground monitoring.

3.1.3.a.8 Actuator

The bipropellant ball valve actuator is a pneumatically operated rack for opening the fuel and oxidizer ball valves (Figure 21). The actuator is mechanically closed via internal spring forces. Comprising the assembly are an actuation piston/cylinder, a toothed rack for mating with the ball valve pinion, closure springs, and a Linear Variable Differential Transformer (LVDT). The LVDT is calibrated to show the percentage of ball valve rotation as a function of the rack's linear motion. Output of the LVDT can be monitored on the "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and BFS (OPS 1, 3, and 6). The output is also in the GNC downlist for ground monitoring.

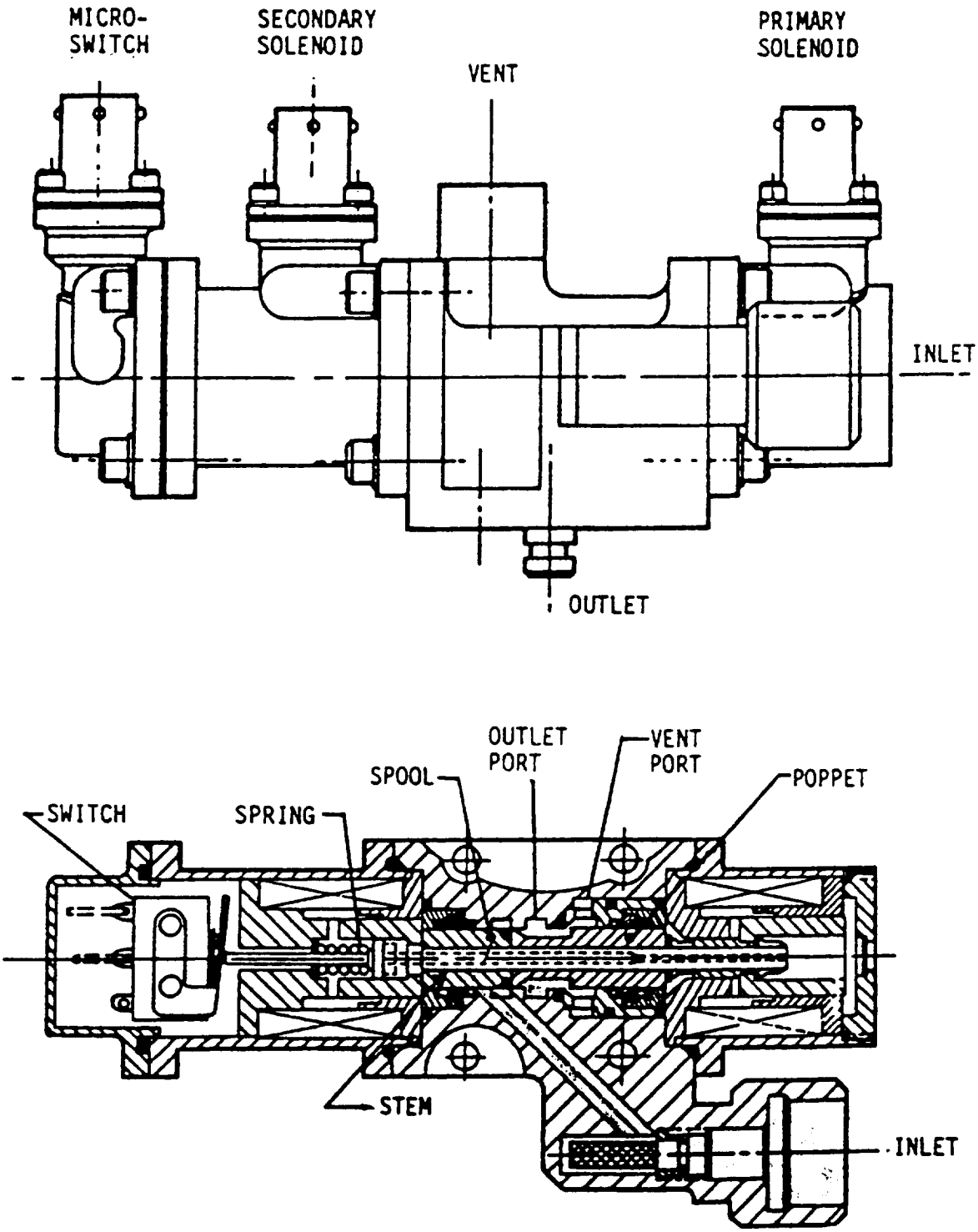



Figure 20 - ENGINE CONTROL VALVE

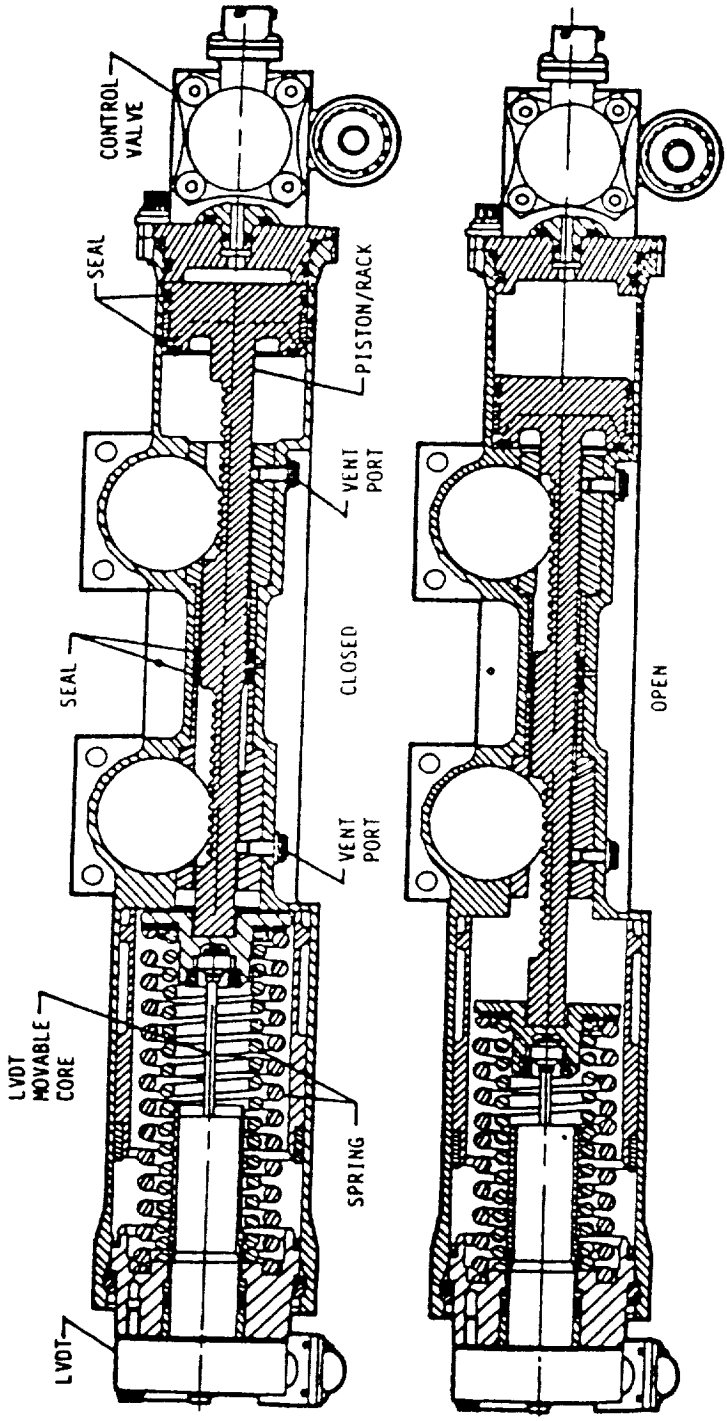



Figure 21 - ACTUATOR ASSEMBLY CROSS SECTION

### 3.1.3.a.9 Bipropellant Ball Valve Assembly

The bipropellant ball valve was analyzed as part of the OME assembly but is discussed here for continuity. The OMS engine bipropellant ball valve is a rotating open/close flow valve used to control the flow of propellant to the OMS engine. The assembly consists of four valves; pairs of fuel and oxidizer valves in series. Each pair is linked mechanically to its actuator via a pinion that mates with the actuator rack. Valve pairs are rotated simultaneously 90 degrees for 100 percent open. There is no instrumentation on these valves. However, nominal valve operation is inferred by engine start, stop, and performance levels.

### 3.1.3.a.10 Engine Purge Valve

The purpose of the engine purge valve is to allow, on command, the flow of regulated GN2 into the engine's fuel (MMH) cooling passages. The GN2 purge is done, nominally after every burn, to minimize the possibility of fuel freezing in the internal cooling and injector flow passages. The assembly consists of two valves in series, a check valve, and instrumentation for monitoring the open-closed status of the purge valves.

The purge valve is a two-way solenoid-operated shutoff valve (Figure 22). With the application of electrical power (23-32 V dc), the valve will open to allow GN2 flow. With the removal of power, internal spring forces will close the valve. During the active GN2 flow conditions the gas is filtered through a sintered stainless steel wire filter at the valve inlet port. Instrumentation consists of a leaf spring switch. The switch is activated by a push rod that is an integral part of the poppet assembly. Closure of the switch completes an electrical circuit to indicate an open position. This signal is part of the GNC downlist for monitoring the valve position by the ground. The purge valve operation is not monitored in the cockpit; however, a purge operation can be inferred by monitoring the "GN2 TK P", "GNC REG P" on GNC SYS SUMM 2, Pc, and injector temperature readings. Integral to the second valve is a check valve of identical design to the check valve of 3.1.3.a.5.

Purging of the OMS engine fuel lines, cooling passages, and injector head is accomplished systematically by the OMS GPC firing sequencer software. Nominally the OMS ENG switch is placed in the "ARM/PRESS" position for a burn. This action opens the ENG PRESS VLV, repressurizing the GN2 reservoir and allowing the GPC to issue the open command to the purge valves following the burn.

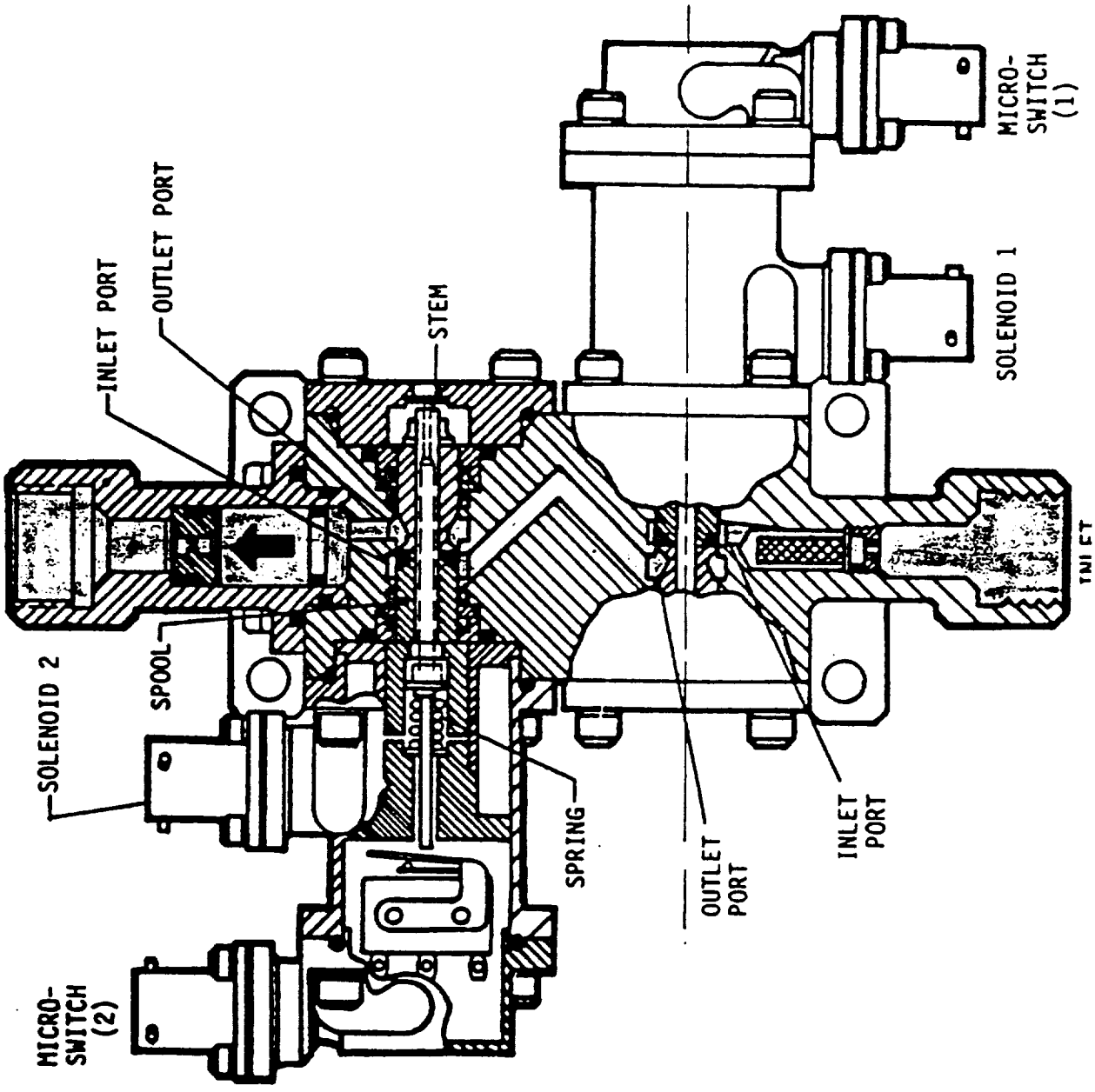



Figure 22 - PURGE VALVE ASSEMBLY CROSS SECTION

If the OMS ENG switch is placed in the "ARM" position, the open commands are inhibited by the GPC.

3.1.3.b OME Assembly

The OME assembly consists of an injector, combustion chamber, nozzle extension, and plumbing. The assembly feeds fuel and oxidizer at the design mixture ratio, confines the combustion of the propellants, and provides for the expansion of the combustion gases to produce thrust. There is one OME assembly in each pod.

3.1.3.b.1 Injector

The OMS engine injector meters, atomizes, and directs fuel and oxidizer into the combustion chamber, at the design mixture ratio. This produces efficient and stable combustion that will provide the required thrust without endangering hardware durability. The injector consists of an oxidizer/fuel manifold, core, fuel distribution ring, platelet injector, and manifold covers (Figure 23). All fuel and oxidizer passages are separated by parent metal or redundant metallurgical joints.

All oxidizer and fuel manifold passages are machined into the stainless steel core billet. The distribution ring mates with the combustion chamber regenerative cooling passages and delivers fuel to the fuel manifold. The injector is made up of six 8-mil thick platelet disks (one external, one face, three metering, and one orifice). Each platelet hole pattern is photographically etched to assure no metal chips or burns remain in the electron beam welded stack. The injector hole pattern consists of 16 concentric alternating rings of oxidizer and fuel orifices. Ring 16 sprays fuel on the combustion chamber wall for film cooling. The manifold covers incorporate attachment bosses for installation of instrumentation (pressure and temperature). All are sealed off except two, one for a combustion chamber pressure transducer and the second for a fuel injector inlet temperature thermocouple. The fuel injector inlet temperature is on "PRPLT THERMAL (DISP 89)" in the PASS (OPS 2) and on "GNC SYS SUMM 2" in the BFS (OPS 1, 3, and 6). The combustion chamber pressure is hardwired to "OMS PRESS PC" meter on panel F7 (output in percent). Both parameters are part of the GNC downlist for ground monitoring. The fuel injector temperature is limit sensed and will trigger an SM alert (class 3) if it exceeds a high limit.

Figure 23 - INJECTOR ASSEMBLY

### 3.1.3.b.2 Combustion Chamber

The OMS engine combustion chamber confines the hot combustion gases in a fixed volume producing the required pressure and temperature that provides the design thrust. The combustion chamber consists of an acoustic resonator, inner and outer walls, nozzle throat, fuel inlet distribution ring, thrust-gimbal ring mounting pads, clevis mounts for attachment of other assemblies and a nozzle attachment flange (Figure 24). Fuel is used to cool the assembly during engine burns by regenerative and film cooling methods.

One hundred twenty longitudinal grooves are machined into the combustor's stainless steel inner wall. When mated to the outer wall these grooves make up the regenerative cooling passages. These passages are aligned and mated to the injector assemblies' fuel distribution ring during final chamber assembly. The remaining part of the regenerative cooling system is the fuel inlet-distribution ring, which is an integral part welded to the outer wall. The nozzle attachment flange is an integral part of the distribution ring. The thrust-gimbal ring mounting pads are also welded to the distribution ring while the hardware-subsystem clevis mounts are welded to the outer chamber wall.

Integral to the inner wall of the combustion chamber is the converging-throat-diverging (initial) section of the engine's nozzle. The converging section has an area ratio (Ac/At) of 1.934:1, which blends into the throat area (approx. 26.5 square inches). The diverging section is the initial section of the engine's bell-shaped exhaust nozzle. The area ratio of this section is 5.866:1 with a mean divergence angle of about 30.5 degrees.

### 3.1.3.b.3 Nozzle Extension

The nozzle extension, when bolted to the combustion chamber, completes the engine's bell-shaped exhaust nozzle (Figure 25). It is fabricated from a columbium alloy sheet stock. Nominal thickness is 0.030 inch. However, the attach flange is made from 0.10 inch sheet and the exhaust plane stiffener ring is from 0.0775 inch sheet. These two sections are tapered to match the 0.030 sheet at the girth welds. The final assembly is coated with a silicide compound as a corrosion preventive. Attachment to the combustion chamber is by a split retainer ring with a graphite gasket. Thirty-six bolts hold the extension in place.

The nozzle exit plane area is about 1458 square inches, resulting in an expansion ration (Ae/At) of 55:1. The

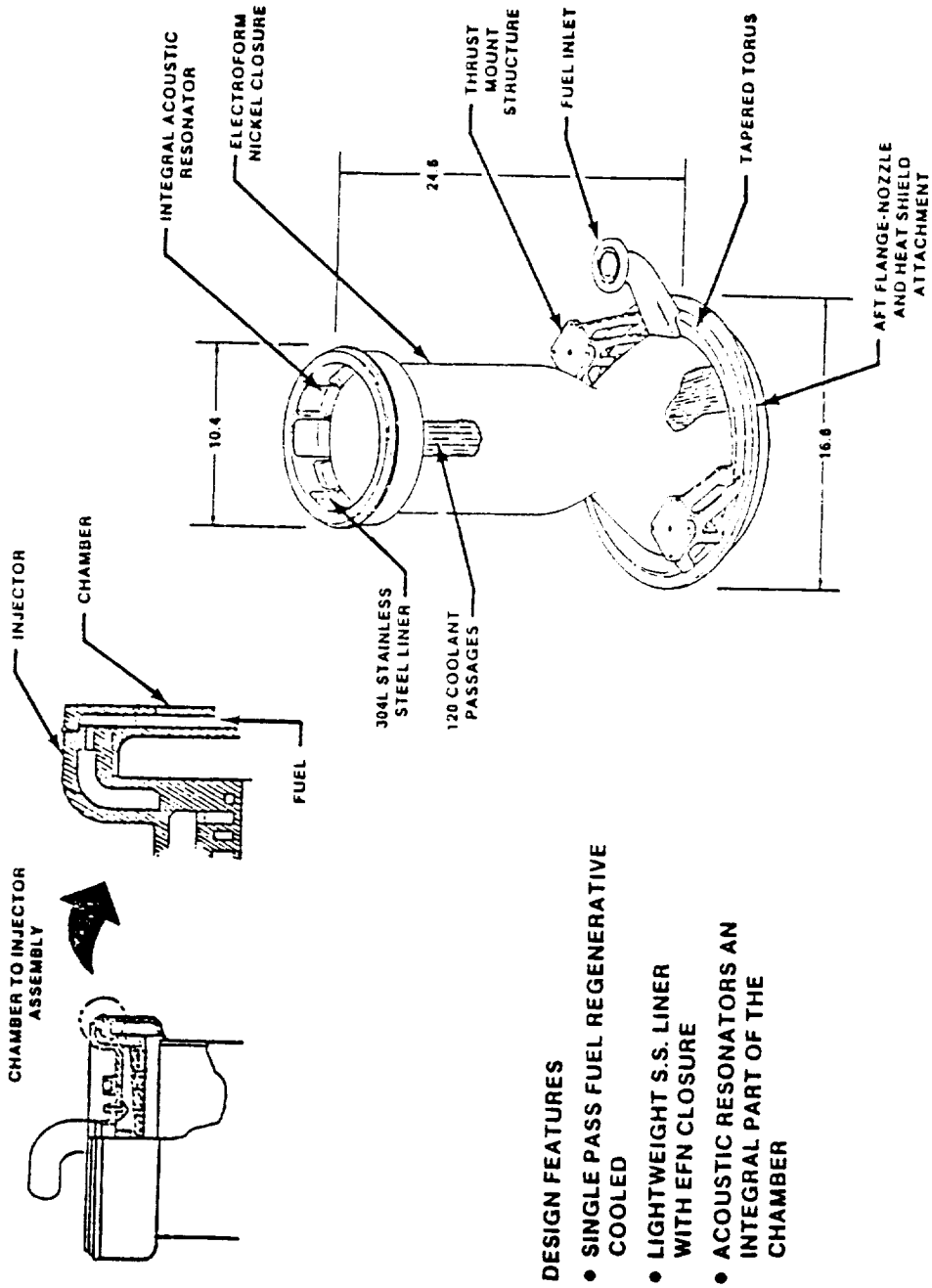
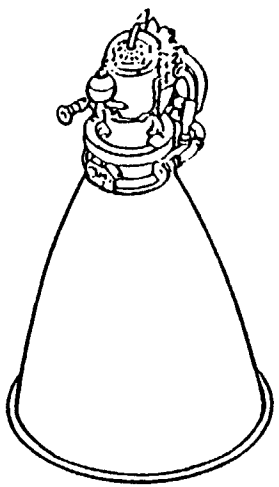
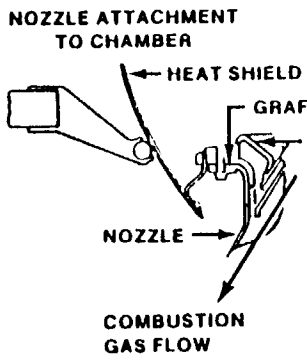
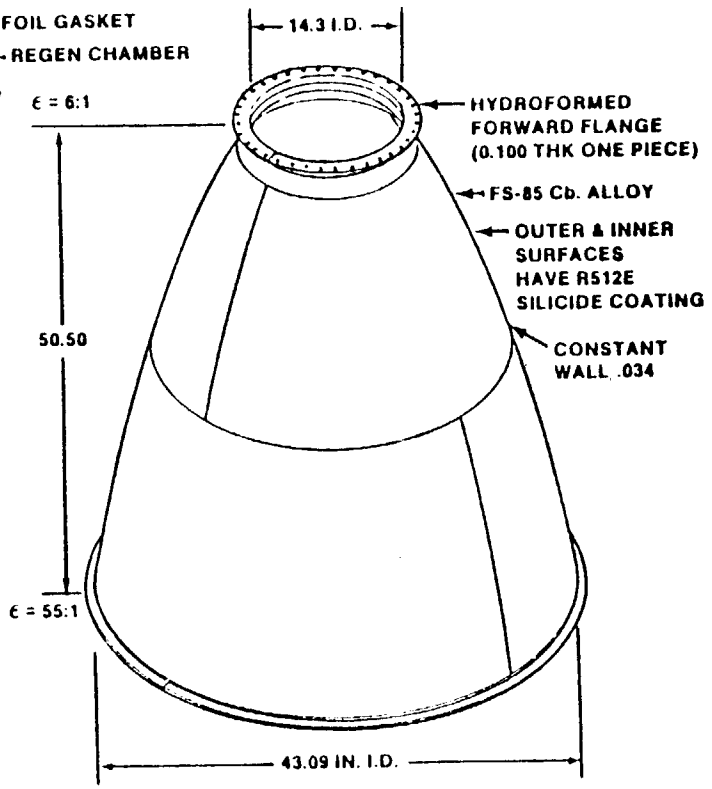



Figure 24 - COMBUSTION CHAMBER ASSEMBLY






## Design Features

- RADIATION COOLED LIGHT WEIGHT ASSEMBLY
- OXIDATION PREVENTING COATING
- ALL COLUMBIUM ALLOY CONSTRUCTION
- 80% BELL NOZZLE CONTOUR
- OVER 20 MIN CONTINUOUS FIRING CAPABILITY

Figure 25 - NOZZLE EXTENSION

exit plane divergent angle is 0.55 degrees, which gives a radial thrust component of about 900 pounds (symmetric). At steady state operation, the exhaust gas exit velocity is approximately 10,100 ft/sec.

3.1.3.b.4 Plumbing

Plumbing for the OMS engine is divided into GN2 (pneumatic), fuel, and oxidizer lines. These lines are fabricated from titanium alloy tubing incorporating integral end fittings.

The fuel and oxidizer inlet lines are fabricated from 1.50-in.-O.D. stainless steel tube. Fittings are welded to the tube for attachment in the propellant feed lines and the inlet side of the bipropellant ball valve assembly. The inlet lines also incorporate bellows to allow for line flexing during gimbal operations and engine assembly. At the attachment to the feed lines, a flow balancing orifice and filter are fitted to each line.

Outlet lines for the fuel and oxidizer are made from 1.250-in. O.D. titanium alloy tubing. End fittings are welded in place for mating to the bipropellant ball valve assembly, the oxidizer inlet manifold, and the fuel's inlet distribution ring. Bellows are incorporated in the lines to allow for engine alignment during vehicle/engine mating.

Instrumentation for the plumbing consists of strain gage type pressure transducers and thermocouples on the fuel and oxidizer inlet lines. The pressure measurements can be monitored in the cockpit on "GNC SYS SUMM 2" in the PASS (OPS 2 and 8) and in the BFS (OPS 1, 3, and 6). The temperatures can be monitored in the cockpit on "PRPLT THERMAL (DISP 89)" in SM OPS 2. The pressures and temperatures are part of the GNC/OI downlist for ground monitoring. The temperatures are also limit sensed and will trigger an SM alert (class 3) if the limits are exceeded.

3.1.3.c TVC (Gimbal) Assembly

Each OMS engine is attached to the Orbiter via a pivoting mount, which can be gimbaled up-and-down (pitch) and side-to-side (yaw) to provide 3-axis thrust vector control (Figure 26). Gimbaling is driven by two electromechanical actuators on each engine (Figure 27). Gimbal travel in the pitch and yaw axes is approximately +/-7 degrees and +/-8 degrees, respectively, about the null. Since the engines are mounted on opposite sides of the Orbiter's centerline (X-axis), pointing one engine up and one down produces a roll

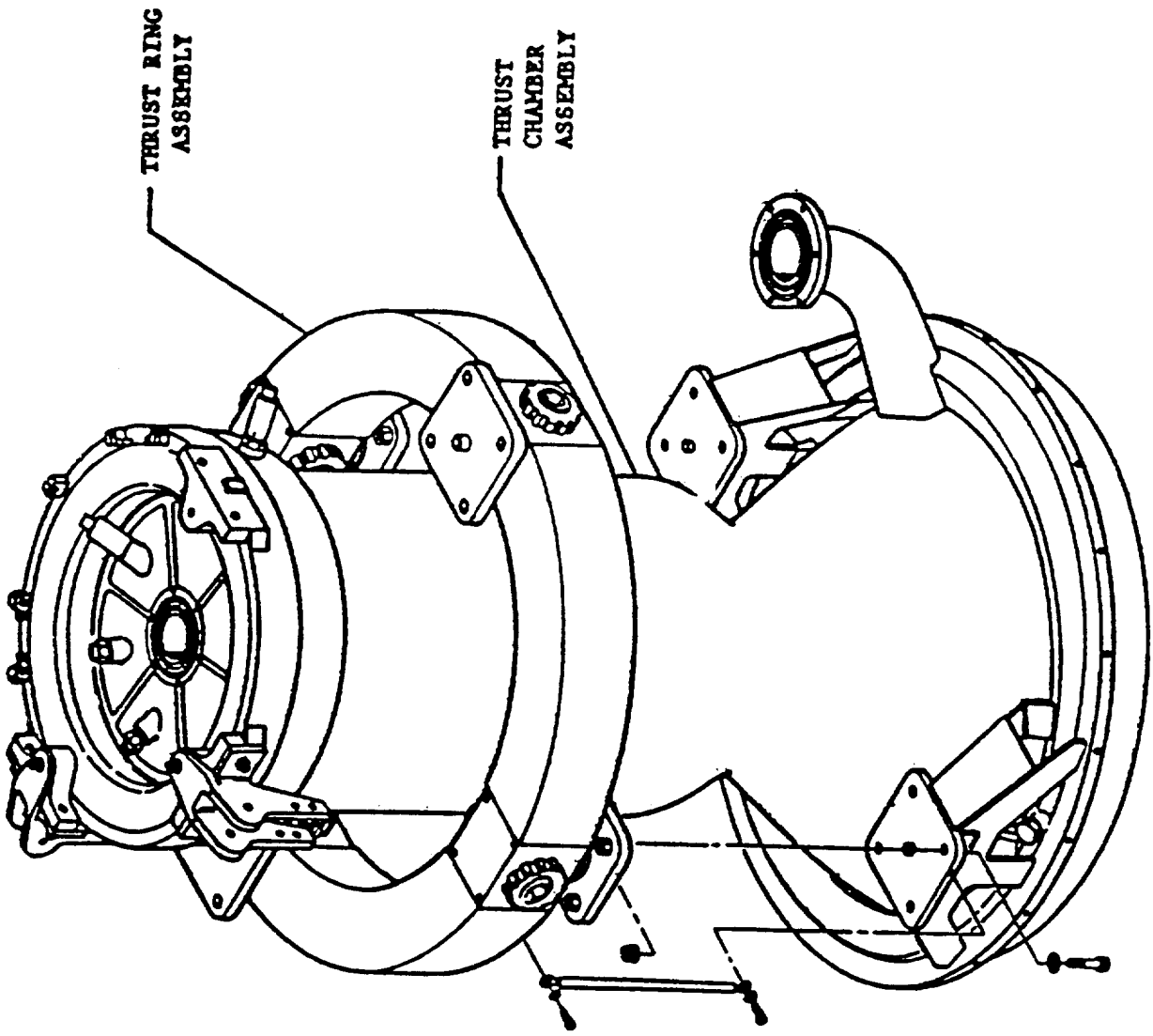



Figure 26 - THRUST RING TO TCA ATTACHMENT

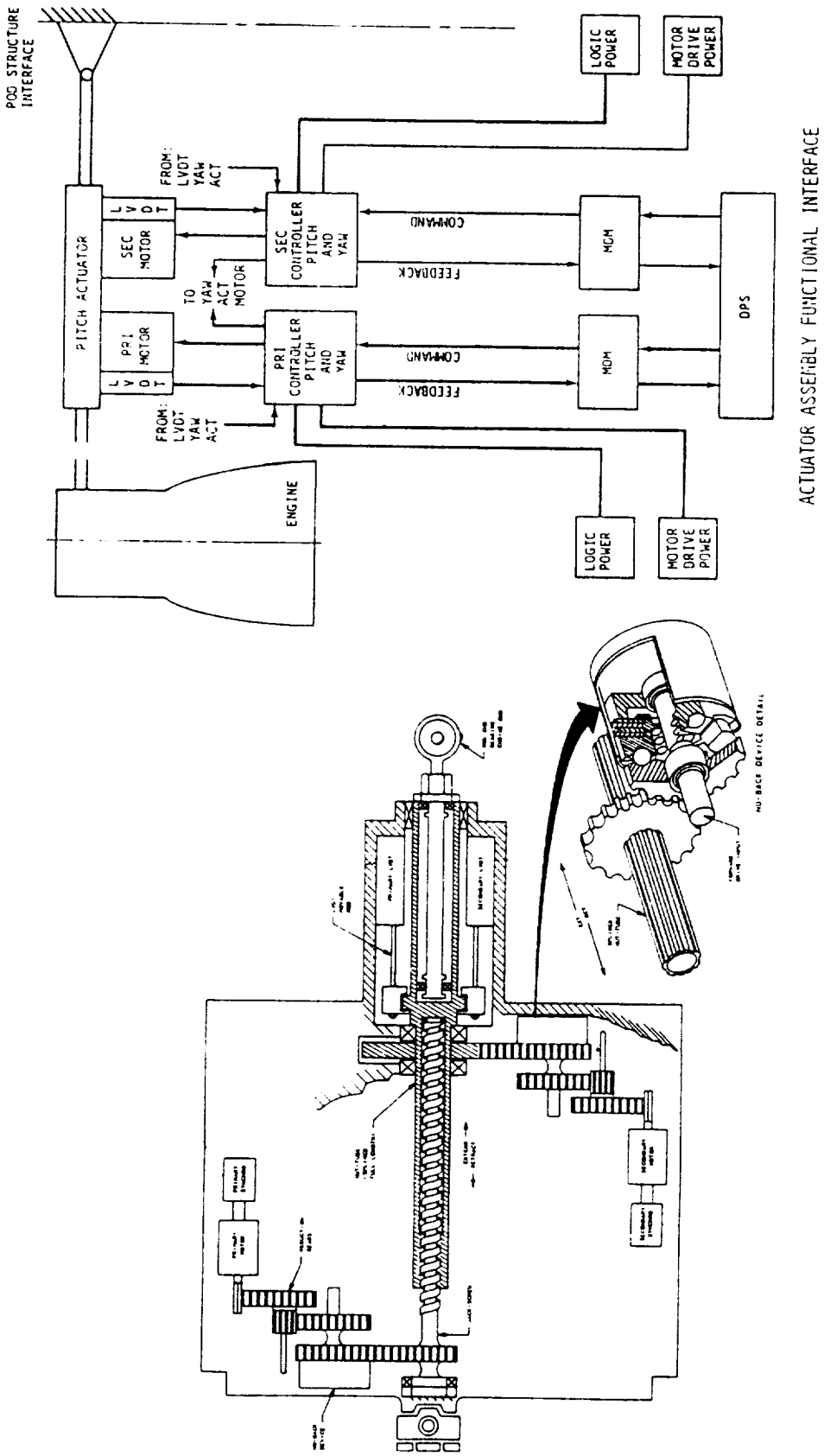



Figure 27 - OMS GIMBAL ACTUATOR

moment. With both engines firing, coordinated 2-axis gimbaling of the two engines produces 3-axis Orbiter flight control. The yaw gimbals control only yaw, whereas the pitch gimbaling produces both a pitch and a roll moment together. 3-axis TVC control is impossible with only one engine. For a one-engine OMS burn, TVC controls pitch and yaw and the RCS is used to control roll. The crew can read the current engine gimbal pitch and yaw angles on the CRT XXXX MNVR YYYY display. The pitch and yaw angles are included in the OI down-list for ground monitoring.

Each gimbal actuator has two channels: primary and secondary. If the active channel stops running, the other can take over. Both channels operate at the same speed, taking four seconds to steer an engine through its entire gimbal range at top speed. The crew can select actuator drive via the CRT XXXX MNVR YYYY display.

### 3.1.4 Electrical Power Distribution and Control Subsystems

#### 3.1.4.a Thermal Control

Thermal control for the OMS is achieved by insulation of propellant lines and walls that enclose OMS hardware components, and by line-wraparound heaters and blanket-type heaters. The heater system is divided into two areas: the OMS/RCS pods, and the aft fuselage cross-feed and bleed lines. Each of the heater systems has two redundant heater systems, A and B, and are controlled by switches on Panel A14.

#### 3.1.4.a.1 Pod Thermal Control

The OMS/RCS pods use heater patches to provide thermal control. Each heater patch consists of a redundant set of wires, or elements, which have been formed into a flat, tightly spiraled patch. The patch is then mounted on existing hardware, and as electricity flows through the highly resistant wires, the heat generated warms the hardware as well as radiating into the surrounding open areas. Each of the OMS/RCS pods are divided into nine heater areas. Each of the heater patches in the pods contain an A and a B element. Each element has a thermostat which controls the temperature from 55 degrees to 75 degrees, +/-5 degrees F. Temperature sensors are located throughout the pods and supply temperature information to the propellant thermal CRT display and to telemetry. The crew can monitor this display only in SM OPS 2, whereas the ground can monitor the temperature in all OPS.

#### 3.1.4.a.2 Crossfeed and Bleedline Thermal Control

The aft fuselage is divided into eleven heater areas. Each area is heated in parallel by heater systems A and B, and each areas has a control thermostat to maintain temperature at 55 degrees to 75 degrees, +/-5 degrees F. Temperature sensors are located on the control thermostats and on the crossfeed and bleed lines. The temperature sensors supply temperature to the propellant thermal CRT display in SM OPS 2, and to telemetry to all OPS.

## 3.2 Interfaces and Locations

The OMS engine interfaces with the Shuttle's Data Processing System (DPS), Pulse Code Modulator Master Unit (PCMMU), Caution and Warning System (C&W), Displays and Controls (D/C), and the Electrical Power Distribution and Control System (EPDCS).

Data from the OMS engine consisting of pressures, temperatures, actuator position, and valve position are sent to the DPS via the Flight Critical (FC) Multiplexer/Demultiplexers (MDMs) for processing by the GPCs. Display and annunciation of the health and status of the engine is accomplished by the DPS via CRT displays, cockpit meters, C&W, and telemetry. The DPS system in turn provides the engine with commands for valve configurations, engine ON/OFF, and Thrust Vector Control (TVC).

A subset of the engine data is sent to the PCMMU via the Operational Instrumentation (OI) MDMs to be telemetered. The PCMMU combines these data with other OMS parameters, output from the GPCs as part of the downlist, and routes them to the onboard recorders and to the S-band to be transmitted to the ground as part of the downlink.

A carefully selected subset of OMS engine data is sent to the C&W for fault determination and alarm annunciation. The C&W processes these data against present limits to determine anomalies in engine performance. When anomalies are found, hardware C&W signals are issued that activate indicator lights in the C&W panel and the master alarm pushbuttons and turn on the C&W tone.

Dedicated cockpit meters in the D&C panels are used to display engine data either sent directly from the engine or routed through the GPCs. The D&C panels also have switches and circuit breakers that are used for manual valve configuration and power routing. In the manual TVC mode, crew deflection of the Rotational Hand Controller (RHC) is routed through the GPC for scaling and then to the engine gimbal actuators to provide TVC.

Electrical power is provided to the engine by the EPDCS. Logic power and dc power is provided to valve relays and TVC servo-actuators.

The OMS also interfaces with the aft RCS through propellant interconnect lines. OMS propellant can be fed to RCS jets for attitude holds, maneuvers, and translations on-orbit, and during aborts for more rapid OMS propellant dumping. RCS propellant is not fed to the OMS.

## 3.3 Hierarchy

Figures 3 and 4 illustrate the hierarchy of the OMS hardware components. Figures 5 through 27 depict the functional details of the OMS subsystem components.

## 4.0 ANALYSIS RESULTS

Detailed analysis results for each of the identified failures are presented in Appendix C. Table I presents a summary of the failure criticalities for the three major hardware subsystems of the OMS. Table II presents a separate summary of the failure criticalities for the Electrical Power Distribution and Control (EPD&C) subsystem of the OMS. Further discussion of each of these subsystems and the applicable failure modes is provided in subsequent paragraphs. The OMS analysis hierarchy is illustrated in Figures 3 and 4.

Of the 284 hardware failure modes analyzed, 160 were determined to be PCIs. A summary of the hardware PCIs is presented in Table III. Of the 667 EPD&C failure modes analyzed, 216 were determined to be PCIs. A summary of the EPD&C PCIs is presented in Table IV.

Appendix D contains a cross reference between each PCI and analysis worksheet in Appendix C.

TABLE I Summary of IOA Failure Modes & Criticalities (OMS HW)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | 3/3 | TOTAL |
|---|---|---|---|---|---|---|---|
| HE PRESS SUBSYSTEM | | | | | | | |
| STORAGE TANK | 2 | - | - | - | - | - | 2 |
| TANK ISOLATION VALVE | 1 | 2 | - | 2 | - | 1 | 6 |
| REGULATOR | - | 5 | - | - | - | - | 5 |
| VAPOR ISOLATION VALVE | 1 | 2 | - | 2 | - | 1 | 6 |
| QUAD CHECK VALVE | 2 | 2 | - | 1 | - | - | 5 |
| COUPLINGS (SINGLE SEAL) | - | 1 | - | - | - | 2 | 3 |
| COUPLINGS (DOUBLE SEAL) | - | - | - | 3 | - | 6 | 9 |
| LINES AND FITTINGS | 2 | 2 | - | - | - | 1 | 5 |
| PROP STOR & DIST SUBSYSTEM | | | | | | | |
| PRESSURE RELIEF ASSEMBLY | 3 | 2 | - | - | - | - | 5 |
| GROUND MANUAL ISOLATION VALVE | 2 | - | - | - | - | 1 | 3 |
| PROPELLANT TANK | 2 | - | - | - | - | - | 2 |
| FWD GAGING PROBE | - | - | - | - | - | 5 | 5 |
| AFT GAGING PROBE | - | - | - | - | - | 5 | 5 |
| TOTALIZER | - | - | - | - | - | 3 | 3 |
| COMMUNICATION SCREEN | - | - | 1 | - | 1 | - | 2 |
| GALLERY LEG SCREEN | - | - | - | - | 1 | - | 1 |
| COLLECTOR MANIFOLD SCREEN | - | - | - | - | 1 | - | 1 |
| TANK ISOLATION VALVE | 1 | 4 | - | - | 1 | 2 | 8 |
| CROSSFEED VALVE | 1 | - | - | 1 | 4 | 2 | 8 |
| COUPLINGS (SINGLE SEAL) | - | 11 | - | - | - | 22 | 33 |
| COUPLINGS (DOUBLE SEAL) | - | - | - | 1 | - | 2 | 3 |
| GIMBAL BELLOWS | 13 | 2 | - | - | - | - | 15 |
| FLEX LINE ASSEMBLY | 2 | - | - | - | - | - | 2 |
| ALIGNMENT BELLOWS | 2 | 1 | - | - | - | - | 3 |
| LINES AND FITTINGS | 4 | 2 | - | - | 1 | 1 | 8 |
| OME SUBSYSTEM | | | | | | | |
| OME ASSEMBLY | | | | | | | |
| INLET FILTER & ORIFICE | - | 2 | - | - | - | - | 2 |
| BIPROPELLANT VALVE | 1 | 5 | - | - | - | - | 6 |
| BIPROP CAVITY PRESS RLF VALVE | 1 | 1 | - | - | - | 3 | 5 |
| PLATELET INJECTOR | 2 | 1 | - | - | - | - | 3 |
| COMBUSTION CHAMBER | 2 | - | - | - | - | - | 2 |
| NOZZLE EXTENSION | 1 | 1 | - | - | - | - | 2 |
| COUPLINGS (SINGLE SEAL) | - | 4 | - | - | - | 8 | 12 |
| TVC GIMBAL BELLOWS | 2 | 1 | - | - | - | - | 3 |
| ALIGNMENT BELLOWS | 1 | 1 | - | - | - | 1 | 3 |
| LINES AND FITTINGS | - | 1 | - | - | - | - | 1 |

TABLE I Summary of IOA Failure Modes & Criticalities (OMS HW)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | 3/3 | TOTAL |
|---|---|---|---|---|---|---|---|
| OME SUBSYSTEM | | | | | | | |
| GN2 ASSEMBLY | | | | | | | |
| TANK FILL/VENT VALVE | - | - | - | 2 | - | 1 | 3 |
| STORAGE TANK | 1 | - | - | 1 | - | - | 2 |
| GN2 PNEUMATIC PACK HOUSING | - | 1 | - | 1 | - | - | 2 |
| PRESSURE ISOLATION VALVE | - | 1 | - | 4 | - | 1 | 6 |
| REGULATOR | - | 3 | - | 2 | - | - | 5 |
| PRESSURE RELIEF VALVE | - | - | - | 4 | - | - | 4 |
| CHECK VALVE | - | 1 | - | 2 | - | - | 3 |
| ACCUMULATOR | 1 | 1 | - | - | - | - | 2 |
| ENGINE CONTROL VALVE | - | 11 | - | - | - | - | 11 |
| PNEUMATIC ACTUATOR | 1 | 5 | - | 2 | - | - | 8 |
| PINION GEAR & DRIVE ASSEMBLY | - | 2 | - | - | - | - | 2 |
| PURGE VALVE ASSEMBLY | - | - | - | 4 | 7 | - | 11 |
| COUPLINGS (SINGLE SEAL) | - | - | - | 1 | - | 2 | 3 |
| COUPLINGS (DOUBLE SEAL) | - | - | - | 1 | - | 5 | 6 |
| LINES & FITTINGS | - | 2 | - | 2 | 1 | 2 | 7 |
| OME SUBSYSTEM | | | | | | | |
| TVC ASSEMBLY | | | | | | | |
| GIMBAL RING | 1 | - | - | - | - | - | 1 |
| GIMBAL RING BEARING | - | 1 | - | - | - | - | 1 |
| GIMBAL RING MOUNTING PAD | 1 | - | - | - | - | - | 1 |
| GIMBAL DRIVE MOTOR | - | - | - | 2 | - | - | 2 |
| ACME SCREW/NUT TUBE | - | 2 | - | - | - | - | 2 |
| REDUCTION GEAR | - | - | - | 2 | - | - | 2 |
| ANTIBACK DEVICE | - | 1 | - | 2 | - | - | 3 |
| GIMBAL DRIVE THRUST BEARING | - | - | - | 2 | - | - | 2 |
| SPHERICAL ROD END BEARING | - | 2 | - | - | - | - | 2 |
| MECHANICAL STOP, SNUBBER | - | 1 | - | - | - | - | 1 |
| NUT TUBE/OUTPUT SHAFT BEARING | - | - | - | 2 | - | - | 2 |
| OUTPUT SHAFT | 1 | - | - | - | - | - | 1 |
| CONTROLLER, GIMBAL ACTUATOR | - | - | - | 2 | - | - | 2 |
| TOTAL | 54 | 87 | 1 | 48 | 17 | 77 | 284 |

TABLE II Summary of IOA Failure Modes & Criticalities (OMS EPD&C)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | 3/3 | TOTAL |
|---|---|---|---|---|---|---|---|
| HE PRESS SUBSYSTEM | | | | | | | |
| CONTROLS | | | | | | | |
| VALVES | | | | | | | |
| CONTROLLER | - | - | - | 16 | - | - | 16 |
| DIODE | - | - | - | 20 | - | - | 20 |
| DRIVER | - | - | - | 4 | - | - | 4 |
| FUSE | - | - | - | 2 | - | - | 2 |
| RESISTOR | - | - | - | - | - | 12 | 12 |
| SWITCH, TOGGLE | - | 4 | - | 2 | - | - | 6 |
| INSTRUMENTATION | | | | | | | |
| METER | - | - | - | - | 1 | - | 1 |
| SENSOR, PRESSURE | - | - | - | - | 2 | - | 2 |
| SENSOR, TEMPERATURE | - | - | - | - | 1 | 1 | 2 |
| SWITCH, TOGGLE | - | - | - | - | 1 | - | 1 |
| PROP STOR & DIST SUBSYSTEM | | | | | | | |
| CONTROLS | | | | | | | |
| VALVES | | | | | | | |
| DIODE | - | 2 | - | 2 | 4 | - | 8 |
| DRIVER | - | - | - | - | 12 | 4 | 16 |
| FUSE | - | - | - | 4 | 4 | - | 8 |
| RELAY | - | - | - | 4 | 12 | 16 | 32 |
| RESISTOR | - | - | - | - | 28 | 44 | 72 |
| SWITCH, TOGGLE | - | 2 | - | 2 | 6 | 2 | 12 |
| INSTRUMENTATION | | | | | | | |
| FUSE | - | - | - | - | - | 2 | 2 |
| INDICATOR, EVENT | - | - | - | - | 4 | - | 4 |
| METER | - | - | - | - | 3 | 1 | 4 |
| SENSOR, PRESSURE | - | - | - | - | - | 2 | 2 |
| SENSOR, TEMPERATURE | - | - | 2 | - | - | - | 2 |
| SWITCH, ROTARY | - | - | - | - | 1 | 1 | 2 |

TABLE II Summary of IOA Failure Modes & Criticalities (OMS EPD&C)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | 3/3 | TOTAL |
|---|---|---|---|---|---|---|---|
| OME SUBSYSTEM | | | | | | | |
| CONTROLS | | | | | | | |
| GN2 ASSEMBLY | | | | | | | |
| VALVES | | | | | | | |
| DIODE | - | - | - | - | - | 8 | 8 |
| DRIVER | - | - | - | 17 | 4 | 1 | 22 |
| FUSE | - | 2 | - | 6 | - | - | 8 |
| RESISTOR | - | 6 | - | - | - | 14 | 20 |
| SWITCH, TOGGLE | - | 2 | - | 2 | 1 | - | 5 |
| TVC ASSEMBLY | | | | | | | |
| CONTROLLER | - | - | - | 4 | - | 4 | 8 |
| FUSE | - | - | - | 2 | - | - | 2 |
| INSTRUMENTATION | | | | | | | |
| GN2 ASSEMBLY | | | | | | | |
| SENSOR, PRESSURE | - | - | 1 | - | 2 | - | 3 |
| OME ASSEMBLY | | | | | | | |
| FUSE | - | - | - | - | - | 2 | 2 |
| METER | - | - | - | - | - | 1 | 1 |
| SENSOR, POSITION | - | - | - | - | 2 | - | 2 |
| SENSOR, PRESSURE | - | - | - | - | - | 3 | 3 |
| SENSOR, TEMPERATURE | - | 1 | - | - | - | 3 | 4 |
| TVC ASSEMBLY | | | | | | | |
| SENSOR, POSITION | - | - | - | 4 | - | - | 4 |
| THERMAL CONTROL SUBSYSTEM | | | | | | | |
| POD | | | | | | | |
| DRIVER | - | 22 | - | - | 22 | - | 44 |
| FUSE | - | - | - | - | 32 | - | 32 |
| HEATER | - | - | - | - | 58 | 6 | 64 |
| RELAY | - | 4 | - | - | 4 | - | 8 |
| RESISTOR | - | - | - | - | 12 | 16 | 28 |
| SENSOR, TEMPERATURE | - | - | - | - | - | 12 | 12 |
| SWITCH, THERMAL | - | 16 | - | - | 16 | - | 32 |
| SWITCH, TOGGLE | - | 2 | - | - | 2 | - | 4 |
| CROSSFEED | | | | | | | |
| DRIVER | - | - | - | - | 12 | - | 12 |
| FUSE | - | - | - | - | 8 | 2 | 10 |
| HEATER | - | - | - | - | 10 | 12 | 22 |
| RELAY | - | - | - | - | 4 | - | 4 |
| RESISTOR | - | - | - | - | 4 | 8 | 12 |
| SENSOR, TEMPERATURE | - | - | 5 | - | - | 8 | 13 |
| SWITCH, THERMAL | - | - | - | - | 32 | 12 | 44 |
| SWITCH, TOGGLE | - | - | - | - | 4 | - | 4 |
| TOTAL | - | 63 | 8 | 91 | 308 | 197 | 667 |

TABLE III Summary of IOA Potential Critical Items (OMS HW)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | TOTAL |
|---|---|---|---|---|---|---|
| HE PRESS SUBSYSTEM | | | | | | |
| STORAGE TANK | 2 | - | - | - | - | 2 |
| TANK ISOLATION VALVE | 1 | 2 | - | 2 | - | 5 |
| REGULATOR | - | 5 | - | - | - | 5 |
| VAPOR ISOLATION VALVE | 1 | 2 | - | 2 | - | 5 |
| QUAD CHECK VALVE | 2 | 2 | - | 1 | - | 5 |
| COUPLINGS (SINGLE SEAL) | - | 1 | - | - | - | 1 |
| LINES AND FITTINGS | 2 | 2 | - | - | - | 4 |
| PROP STOR & DIST SUBSYSTEM | | | | | | |
| PRESSURE RELIEF ASSY. | 3 | 2 | - | - | - | 5 |
| GROUND MANUAL ISOLATION VALVE | 2 | - | - | - | - | 2 |
| PROPELLANT TANK | 2 | - | - | - | - | 2 |
| COMMUNICATION SCREEN | - | - | 1 | - | 1 | 2 |
| GALLERY LEG SCREEN | - | - | - | - | 1 | 1 |
| COLLECTOR MANIFOLD SCREEN | - | - | - | - | 1 | 1 |
| TANK ISOLATION VALVE | 1 | 4 | - | - | - | 5 |
| CROSSFEED VALVE | 1 | - | - | 1 | 1 | 3 |
| COUPLINGS (SINGLE SEAL) | - | 11 | - | - | - | 11 |
| GIMBAL BELLOWS | 13 | 2 | - | - | - | 15 |
| FLEX LINE ASSEMBLY | 2 | - | - | - | - | 2 |
| ALIGNMENT BELLOWS | 2 | 1 | - | - | - | 3 |
| LINES AND FITTINGS | 4 | 2 | - | - | 1 | 7 |
| OME SUBSYSTEM | | | | | | |
| OME ASSEMBLY | | | | | | |
| INLET FILTER & ORIFICE | - | 2 | - | - | - | 2 |
| BIPROPELLANT VALVE | 1 | 5 | - | - | - | 6 |
| BIPROP CAVITY PRESS RLF VALVE | 1 | 1 | - | - | - | 2 |
| PLATELET INJECTOR | 2 | 1 | - | - | - | 3 |
| COMBUSTION CHAMBER | 2 | - | - | - | - | 2 |
| NOZZLE EXTENSION | 1 | 1 | - | - | - | 2 |
| COUPLINGS (SINGLE SEAL) | - | 4 | - | - | - | 4 |
| TVC GIMBAL BELLOWS | 2 | 1 | - | - | - | 3 |
| ALIGNMENT BELLOWS | 1 | 1 | - | - | - | 2 |
| LINES AND FITTINGS | - | 1 | - | - | - | 1 |

TABLE III Summary of IOA Potential Critical Items (OMS HW)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | TOTAL |
|---|---|---|---|---|---|---|
| OME SUBSYSTEM | | | | | | |
| GN2 ASSEMBLY | | | | | | |
| STORAGE TANK | 1 | - | - | - | - | 1 |
| GN2 PNEUMATIC PACK HOUSING | - | 1 | - | - | - | 1 |
| PRESSURE ISOLATION VLV | - | 1 | - | - | - | 1 |
| REGULATOR | - | 3 | - | - | - | 3 |
| CHECK VALVE | - | 1 | - | 2 | - | 3 |
| ACCUMULATOR | 1 | 1 | - | - | - | 2 |
| ENGINE CONTROL VALVE | - | 11 | - | - | - | 11 |
| PNEUMATIC ACTUATOR | 1 | 5 | - | 1 | - | 7 |
| PINION GEAR & DRIVE ASSEMBLY | - | 2 | - | - | - | 2 |
| PURGE VALVE ASSEMBLY | - | - | - | 3 | - | 3 |
| LINES & FITTINGS | - | 2 | - | 1 | - | 3 |
| OME SUBSYSTEM | | | | | | |
| TVC ASSEMBLY | | | | | | |
| GIMBAL RING | 1 | - | - | - | - | 1 |
| GIMBAL RING BEARING | - | 1 | - | - | - | 1 |
| GIMBAL RING MOUNT. PAD | 1 | - | - | - | - | 1 |
| ACME SCREW/NUT TUBE | - | 2 | - | - | - | 2 |
| ANTIBACK DEVICE | - | 1 | - | - | - | 1 |
| SPHERICAL ROD END BEARING | - | 2 | - | - | - | 2 |
| MECHANICAL STOP,SNUBBER | - | 1 | - | - | - | 1 |
| OUTPUT SHAFT | 1 | - | - | - | - | 1 |
| TOTAL | 54 | 87 | 1 | 13 | 5 | 160 |

TABLE IV Summary of IOA Potential Critical Items (OMS EPD&C)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | TOTAL |
|---|---|---|---|---|---|---|
| HE PRESS SUBSYSTEM | | | | | | |
| CONTROLS | | | | | | |
| VALVES | | | | | | |
| CONTROLLER | - | - | - | 1 | - | 1 |
| DIODE | - | - | - | 6 | - | 6 |
| DRIVER | - | - | - | - | - | - |
| FUSE | - | - | - | - | - | - |
| RESISTOR | - | - | - | - | - | - |
| SWITCH, TOGGLE | - | 4 | - | - | - | 4 |
| INSTRUMENTATION | | | | | | |
| METER | - | - | - | - | - | - |
| SENSOR, PRESSURE | - | - | - | - | - | - |
| SENSOR, TEMPERATURE | - | - | - | - | - | - |
| SWITCH, TOGGLE | - | - | - | - | - | - |
| PROP STOR & DIST SUBSYSTEM | | | | | | |
| CONTROLS | | | | | | |
| VALVES | | | | | | |
| DIODE | - | 2 | - | 2 | 4 | 8 |
| DRIVER | - | - | - | - | - | - |
| FUSE | - | - | - | - | - | - |
| RELAY | - | - | - | 4 | 8 | 12 |
| RESISTOR | - | - | - | - | 28 | 28 |
| SWITCH, TOGGLE | - | 2 | - | - | - | 2 |
| INSTRUMENTATION | | | | | | |
| FUSE | - | - | - | - | - | - |
| INDICATOR, EVENT | - | - | - | - | - | - |
| METER | - | - | - | - | - | - |
| SENSOR, PRESSURE | - | - | - | - | - | - |
| SENSOR, TEMPERATURE | - | - | 2 | - | - | 2 |
| SWITCH, ROTARY | - | - | - | - | - | - |

TABLE IV Summary of IOA Potential Critical Items (OMS EPD&C)

| Criticality: | 1/1 | 2/1R | 2/2 | 3/1R | 3/2R | TOTAL |
|---|---|---|---|---|---|---|
| OME SUBSYSTEM | | | | | | |
| CONTROLS | | | | | | |
| GN2 ASSEMBLY | | | | | | |
| VALVES | | | | | | |
| DIODE | - | - | - | - | - | - |
| DRIVER | - | - | - | 10 | 4 | 14 |
| FUSE | - | 2 | - | 6 | - | 8 |
| RESISTOR | - | 6 | - | - | - | 6 |
| SWITCH, TOGGLE | - | 2 | - | 2 | 1 | 5 |
| TVC ASSEMBLY | | | | | | |
| CONTROLLER | - | - | - | - | - | - |
| FUSE | - | - | - | - | - | - |
| INSTRUMENTATION | | | | | | |
| GN2 ASSEMBLY | | | | | | |
| SENSOR, PRESSURE | - | - | 1 | - | - | 1 |
| OME ASSEMBLY | | | | | | |
| FUSE | - | - | - | - | - | - |
| METER | - | - | - | - | - | - |
| SENSOR, POSITION | - | - | - | - | - | - |
| SENSOR, PRESSURE | - | - | - | - | - | - |
| SENSOR, TEMPERATURE | - | 1 | - | - | - | 1 |
| TVC ASSEMBLY | | | | | | |
| SENSOR, POSITION | - | - | - | - | - | - |
| THERMAL CONTROL SUBSYSTEM | | | | | | |
| POD | | | | | | |
| DRIVER | - | 22 | - | - | - | 22 |
| FUSE | - | - | - | - | - | - |
| HEATER | - | - | - | - | 41 | 41 |
| RELAY | - | 4 | - | - | - | 4 |
| RESISTOR | - | - | - | - | - | - |
| SENSOR, TEMPERATURE | - | - | - | - | - | - |
| SWITCH, THERMAL | - | 16 | - | - | - | 16 |
| SWITCH, TOGGLE | - | 2 | - | - | - | 2 |
| CROSSFEED | | | | | | |
| DRIVER | - | - | - | - | - | - |
| FUSE | - | - | - | - | - | - |
| HEATER | - | - | - | - | 10 | 10 |
| RELAY | - | - | - | - | 1 | 1 |
| RESISTOR | - | - | - | - | - | - |
| SENSOR, TEMPERATURE | - | - | 5 | - | - | 5 |
| SWITCH, THERMAL | - | - | - | - | 17 | 17 |
| SWITCH, TOGGLE | - | - | - | - | - | - |
| TOTAL | - | 63 | 8 | 31 | 114 | 216 |

## 4.1 Analysis Results - Helium Pressurization Subsystem

Forty-one (41) failure modes were analyzed in the helium pressurization subsystem and twenty-seven (27) are identified as PCIs. Of the 27 PCIs, twenty-two (22) are single point failures which could result in possible damage to surrounding pod components, inability to repressurize the propellant tanks, or mixing of hypergolic propellants in helium lines. The remaining five (5) PCIs could result in the loss of life or vehicle if all redundancy were lost.

These critical failures are caused by helium tank rupture, helium leakage due to structural failure of components or lines, flow path loss due to failure to open of components or system contamination, and check valve failures. The redundancy provided by the existence of two OMS pods is of no benefit in the helium pressurization subsystem since there is no helium connection between the pods.

## 4.2 Analysis Results - Propellant Storage and Distribution Subsystem

One hundred seven (107) failure modes were analyzed in the propellant storage and distribution subsystem, of which fifty-nine (59) are identified as PCIs. Fifty-three (53) of the 59 PCIs are single point failures which could result in leakage of propellant, inability to use or deplete propellant, system overpressurization, or loss of OMEs. One (1) of the 59 PCIs could result in the loss of life or vehicle if all redundancy were lost. The remaining five (5) PCIs could result in loss of mission with the loss of all redundancy.

These critical failures are caused by structural failure of the propellant tank, components, and propellant lines, seal failures, contamination, failure of valves to open, failure of the pressure relief assembly, and acquisition system screen structural failures. The dual pod redundancy benefits only those components located downstream of the crossfeed line.

## 4.3 Analysis Results - Orbital Maneuvering Engine Subsystem

### 4.3.1 Analysis Results - OME Assembly

Thirty-nine (39) failure modes were analyzed in the OME assembly, of which twenty-seven (27) are identified as PCIs. All of the 27 PCIs are single point failures resulting in the leakage of propellant, loss of propellant flow path, engine explosion, or loss of engine on-off control.

These critical failures are caused by structural failure of components and propellant lines, seal failures, contamination, failure to open or close of the bipropellant valves, inadequate engine cooling, and structural failures of the injector assembly, combustion chamber, and nozzle extension.

### 4.3.2 Analysis Results - OME GN2 Pressurization Subsystem

Seventy-five (75) failure modes were analyzed in the GN2 pressurization subsystem and thirty-seven (37) are found to be PCIs. Thirty (30) of the 37 PCIs are single point failures which could result in possible shrapnel damage to surrounding pod components or inability to actuate the bipropellant valves. The remaining seven (7) PCIs could produce the same result after the loss of all redundancy.

These critical failures are caused by storage tank, accumulator, and actuator ruptures, leakage of GN2 due to structural failures of components, lines, and seal failures, loss of GN2 flow path due to failure to open of components or system contamination, and structural failures of the actuator and rack-and-pinion assemblies. The accumulator is considered redundant for upstream pressurization loss failures because of its remaining single engine start capability.

The loss of purge capability is a critical failure for the Manual TAL procedure, which is considered a contingency abort mode.

### 4.3.3 Analysis Results - OME Thrust Vector Control Subsystem

Of the twenty-two (22) failure modes analyzed in the TVC subsystem, ten (10) are identified as PCIs. All of the 10 PCIs are single point failures which could result in possible propellant leakage, engine burn-through, or possible loss of vehicle control.

These critical failures are caused by structural failures in the gimbal actuators and engine-to-vehicle attachments.

Loss of TVC control of one engine is also a critical failure for the Manual TAL procedure, which is considered a contingency abort mode.

## 4.4 Analysis Results - Electrical Power Distribution and Control Subsystem

### 4.4.1 Analysis Results - Controls

Two hundred and eighty-one (281) failure modes have been analyzed in the EPD&C controls subsystem and ninety-four (94) are PCIs. Of the 94 PCIs, eighteen (18) are single point failures since their failure resulted in critical valves being stuck open or closed. Another thirty-one (31) of the 94 PCIs could result in loss of vehicle/life if all redundancy were lost. The remaining forty-five (45) PCIs could result in loss of mission if all redundancy were lost.

Criticalities assigned to EDP&C failure modes were derived from the effect the failure had on the component being controlled (valve or TVC actuator). The majority of the EPD&C items

controlled valves. Therefore, critical EPD&C failure modes caused critical valves to be stuck open or closed resulting in overpressurization of lines, underpressurization of lines, mixing of hypergolic propellants, loss of crossfeed, or loss of bi-propellant valve control.

### 4.4.2 Analysis Results - Instrumentation

Forty-one (41) failure modes have been analyzed in the EPD&C instrumentation subsystem and four (4) are PCIs. All four of the PCIs are single point failures. Three (3) are false indications of low propellant temperature in either the TK or engine inlet line. The remaining one (1) PCI is a false sensor indication in the GN2 assembly. The effect is OME engine failure criticalities assigned to instrumentation (pressure, position, and temperature sensors) failure modes are based on the ability to discern between the failure of the sensor and a real failure of the system. Also taken into account was the time available in which a decision, based on instrument indication, must be made.

### 4.4.3 Analysis Results - Thermal Control

Three hundred forty-five (345) failure modes have been analyzed in the thermal control subsystem and one hundred eighteen (118) are PCIs. Forty-nine (49) of the 118 are single point failures leading to possible pod structural damage, an unplanned change in vehicle attitude, or early mission termination. The remaining sixty-nine (69) PCIs result in the pod or crossfeed HTR system failed "off" once all redundancy has failed. The effects of losing the thermal system are unplanned change in vehicle attitude, loss of crossfeed/interconnect, or early mission termination.

## 5.0 REFERENCES

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# APPENDIX A
# ACRONYMS

Ac - Nozzle inlet plane area
ac - Alternating Current
Ae - Nozzle exit plane area
AOA - Abort Once Around
At - Nozzle throat area
ASSY - Assembly
ATO - Abort to Orbit
ATT - Attitude
BFS - Backup Flight System
CIL - Critical Items List
CL - Close (Closed)
CRIT - Criticality
CRT - Cathode Ray Tube
C&W - Caution and Warning System
D/C - Displays and Controls
DAP - Digital Autopilot
dc - direct current
DISP - Display
DPS - Data Processing System
EPD&C - Electrical Power Distribution and Control
EPDCS - Electrical Power Distribution and Control System
F - Functional, Fahrenheit
FC - Flight Critical
FDA - Fault Detection Annunciation
FM - Failure Mode
FMEA - Failure Mode and Effects Analysis
FRCS - Forward Reaction Control System
FSSR - Flight Systems Software Requirements
ft - Feet
FU - Fuel
G - Gravity
GFE - Government Furnished Equipment
GN2 - Gaseous Nitrogen
GNC - Guidance Navigation and Control
GPC - General Purpose Computer
GSE - Ground Support Equipment
He - Helium
HW - Hardware
Hz - Hertz (cycles per second)
IOA - Independent Orbiter Assessment
Isol - Isolation
JSC - Johnson Space Center
LPS - Launch Processing System
LRU - Line Replaceable Unit
LVDT - Linear Variable Differential Transformer
MCA - Motor Control Assembly
MCC - Mission Control Center (JSC)
MDAC - McDonnell Douglas Astronautics Company

MDM - Multiplexer/Demultiplexer
MECO - Main Engine Cutoff
MM - Major Mode
MMH - Monomethyl Hydrazine
MNVR - Maneuver
MOD - Mission Operations Directorate
MSEC - millisecond
N2O4 - Nitrogen Tetroxide
NA - Not Applicable
NASA - National Aeronautics and Space Administration
NSTS - National Space Transportation System
NTO - Nitrogen Tetroxide
O.D. - Outside Diameter
OI - Operational Instrumentation
OMRSD - Operational Maintenance Requirements and Specifications Document
OME - Orbital Maneuvering Engine
OMS - Orbital Maneuvering System
OP - Open
OPS - Operations
OX - Oxidizer
OXID - Oxidizer
PASS - Primary Avionics Software System
PBI - Push-Button Indicator
Pc - Chamber Pressure
PCI - Potential Critical Item
PCMMU - Pulse Code Modulator Master Unit
PLS - Primary Landing Site
PRESS - Pressure
psi - Pounds Per Square Inch
psia - Pounds Per Square Inch Absolute
psid - Pounds Per Square Inch Differential
psig - Pounds Per Square Inch Gage
RCS - Reaction Control System
RHC - Rotational Hand Controller
RI - Rockwell International
RM - Redundancy Management
RPC - Remote Power Controller
RTLS - Return to Launch Site
scfm - Standard Cubic Feet per Minute
SFOM - Shuttle Flight Operations Manual
SM - Systems Management
SPEC - Specification
STS - Space Transportation System
SSSH - Space Shuttle Systems Handbook
SW - Software
TAL - Transatlantic Abort Landing
TCA - Thrust Chamber Assembly
TD - Touch Down
TK - Tank
TPS - Thermal Protection System
TVC - Thrust Vector Control
V - Velocity, Volts
VLV - Valve

# APPENDIX B

## DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

# APPENDIX B
# DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

## B.1 Definitions

Definitions contained in NSTS 22206, Instructions For Preparation of FMEA/CIL, 10 October 1986, were used with the following amplifications and additions.

INTACT ABORT DEFINITIONS:

RTLS - begins at transition to OPS 6 and ends at transition to OPS 9, post-flight

TAL - begins at declaration of the abort and ends at transition to OPS 9, post-flight

AOA - begins at declaration of the abort and ends at transition to OPS 9, post-flight

ATO - begins at declaration of the abort and ends at transition to OPS 9, post-flight

CREDIBLE (CAUSE) - an event that can be predicted or expected in anticipated operational environmental conditions. Excludes an event where multiple failures must first occur to result in environmental extremes

CONTINGENCY CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

EARLY MISSION TERMINATION - termination of onorbit phase prior to planned end of mission

EFFECTS/RATIONALE - description of the case which generated the highest criticality

HIGHEST CRITICALITY - the highest functional criticality determined in the phase-by-phase analysis

MAJOR MODE (MM) - major sub-mode of software operational sequence (OPS)

MC - Memory Configuration of Primary Avionics Software System (PASS)

MISSION - assigned performance of a specific Orbiter flight with payload/objective accomplishments including orbit phasing and altitude (excludes secondary payloads such as GAS cans, middeck P/L, etc.)

MULTIPLE ORDER FAILURE - describes the failure due to a single cause or event of all units which perform a necessary (critical) function

OFF-NOMINAL CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

OPS - software operational sequence

PRIMARY MISSION OBJECTIVES - worst case primary mission objectives are equal to mission objectives

PHASE DEFINITIONS:

PRELAUNCH PHASE - begins at launch count-down Orbiter power-up and ends at moding to OPS Major Mode 102 (liftoff)

LIFTOFF MISSION PHASE - begins at SRB ignition (MM 102) and ends at transition out of OPS 1 (Synonymous with ASCENT)

ONORBIT PHASE - begins at transition to OPS 2 or OPS 8 and ends at transition out of OPS 2 or OPS 8

DEORBIT PHASE - begins at transition to OPS Major Mode 301 and ends at first main landing gear touchdown

LANDING/SAFING PHASE - begins at first main gear touchdown and ends with the completion of post-landing safing operations

## B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in NSTS 22206, Instructions for Preparation of FMEA/CIL, 10 October 1986, was employed with the following amplifications and additions.

1. The operational flight software is an accurate implementation of the Flight System Software Requirements (FSSRs).

   RATIONALE: Software verification is out-of-scope of this task.

2. After liftoff, any parameter which is monitored by system management (SM) or which drives any part of the Caution and Warning System (C&W) will support passage of Redundancy Screen B for its corresponding hardware item.

   RATIONALE: Analysis of on-board parameter availability and/or the actual monitoring by the crew is beyond the scope of this task.

3. Any data employed with flight software is assumed to be functional for the specific vehicle and specific mission being flown.

   RATIONALE: Mission data verification is out-of-scope of this task.

4. All hardware (including firmware) is manufactured and assembled to the design specifications/drawings.

   RATIONALE: Acceptance and verification testing is designed to detect and identify problems before the item is approved for use.

5. All Flight Data File crew procedures will be assumed performed as written, and will not include human error in their performance.

   RATIONALE: Failures caused by human operational error are out-of-scope of this task.

6. All hardware analyses will, as a minimum, be performed at the level of analysis existent within NASA/Prime Contractor Orbiter FMEA/CILs, and will be permitted to go to greater hardware detail levels but not lesser.

   RATIONALE: Comparison of IOA analysis results with other analyses requires that both analyses be performed to a comparable level of detail.

7. Verification that a telemetry parameter is actually monitored during AOS by ground-based personnel is not required.

   RATIONALE: Analysis of mission-dependent telemetry availability and/or the actual monitoring of applicable data by ground-based personnel is beyond the scope of this task.

8. The determination of criticalities per phase is based on the worst case effect of a failure for the phase being analyzed. The failure can occur in the phase being analyzed or in any previous phase, whichever produces the worst case effects for the phase of interest.

   RATIONALE: Assigning phase criticalities ensures a thorough and complete analysis.

9. Analysis of wire harnesses, cables, and electrical connectors to determine if FMEAs are warranted will not be performed nor FMEAs assessed.

   RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

10. Analysis of welds or brazed joints that cannot be inspected will not be performed nor FMEAs assessed.

    RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

11. Emergency system or hardware will include burst discs and will exclude the EMU Secondary Oxygen Pack (SOP), pressure relief valves and the landing gear pyrotechnics.

    RATIONALE: Clarify definition of emergency systems to ensure consistency throughout IOA project.

## B.3 OMS Ground Rules and Assumptions

The IOA analysis was performed to the component or assembly level. The analysis considered the worst case effects of the hardware or functional failure on the subsystem, mission, and crew and vehicle safety.

1. Top level redundancy will be considered in determining functional criticality. The OMS function is to provide delta-V for orbit insertion, on-orbit ops, and deorbit. From a top down system analysis approach, the OMS has redundancy via the left and right subsystems. In determining redundancy for hardware items downstream of the crossfeed line, items which perform the same function in each pod may be considered redundant to each other, depending on the failure mode.

2. No RCS backup deorbit capability exists in the event of loss of OMS deorbit capability. It cannot be ensured that enough OMS propellant will remain to complete an RCS deorbit burn since the RCS jets have a lower Isp. However, OMS through RCS can be used to achieve orbit insertion. An AOA abort can be accomplished without OMS engines.

3. Loss of an OME is, at a minimum, a loss of mission during the on-orbit phase. Loss of the first OME is possible loss of mission objectives (ref. flight rule 6-48), and loss of the next OME will lead to loss of deorbit capability (no RCS deorbit assumed) and loss of life/vehicle. An OMS engine which will be used only for critical burns is not considered lost.

4. OMS blowdown capability to use/deplete OMS prop will be determined by MOD HP9825 Blowdown program.

5. The OMS payload bay kit hardware will not be addressed in this analysis.

6. Flight rules and Flight Systems Software Requirements (FSSR) will not be used to downgrade criticalities, only to upgrade and provide better system understanding.

7. Redundant seals are considered in analyzing internal and external leakage of components.

8. An OMS TVC failure (inability to control position of OMS engine) does not affect the ability to perform an OMS dump before MECO.

9. Analysis of component filters are covered in the analysis of the component. Filters which are not integral to other components are analyzed seperately.

10. For the thermal control analysis it is assumed that, at the time of vehicle liftoff, all areas of the thermal environment are within redlines.

11. If applicable, the redundancy and criticalities assigned to an electrical component shall be tied to those assigned to mechanical parts affected by the failure of the electrical component.

12. Electrical components which enable and inhibit operation (e.g., allows a valve to be opened and closed) shall not be redundant to electrical components which control the operation (e.g., actually opens and closes the valve).

13. Instrumentation passage of screen B does not require the ability to discern between sensor or hardware failure, but on detection of the measurement being out of a predefined limit. The ability to differentiate between sensor and hardware failure will be reflected in the criticality assignment.

14. Two OMS engines are required to ensure the successful completion of RTLS and TAL pre-MECO OMS dumps. Loss of one engine may result in the inability to complete the planned dump before MECO leading to violations of propellant tank landing constraints and/or Orbiter mass properties constraints.

15. The Manual TAL procedure is considered a contingency abort mode. The Manual TAL is different from the normal intact TAL abort, as defined in STS 22206, due to the Manual TAL requirement of a post-MECO OMS dump. Criticalities assigned for a Manual TAL are not considered in the final abort criticality assignment, but are included in the Effects/Rationale portion of the analysis sheets as additional information. In assigning Manual TAL criticalities, the following assumptions were made: (1) two OMS engines are required to perform the post-MECO OMS dump to avoid Orbiter mass properties violations, (2) both engines must, therefore, have successful purges between the pre and post-MECO dumps, and (3) loss of TVC control of one engine will result in either inability to use the affected engine or loss of vehicle control.

16. The crew will manually shut down an OMS engine in response to an OMS FDA caused by the violation of engine operating limits before the effects become life/vehicle threatening (e.g., engine explosion). However, this action may not preclude damage to and loss of the engine. This assumption does not apply to failures which lead directly to catastrophic effects (e.g., engine structural failures).

# APPENDIX C
# DETAILED ANALYSIS

This section contains the IOA analysis worksheets generated during the analysis of this subsystem. The information on these worksheets is intentionally similar to the NASA FMEAs. Each of these sheets identifies the item being analyzed and the parent assembly. For each failure mode, the possible causes are outlined, and the assessed hardware and functional criticality for each mission phase is listed, as described in the NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. Finally, effects are entered at the bottom of each sheet, and the worst case criticality is entered at the top.

## LEGEND FOR IOA ANALYSIS WORKSHEETS

Hardware Criticalities:

- 1 = Loss of life or vehicle
- 2 = Loss of mission or next failure of any redundant item (like or unlike) could cause loss of life/vehicle
- 3 = All others

Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission.

Redundancy Screen A:

- 1 = Is Checked Out PreFlight
- 2 = Is Capable of Check Out PreFlight
- 3 = Not Capable of Check Out PreFlight
- NA = Not Applicable

Redundancy Screens B and C:

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 100

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: TANK, HELIUM STORAGE
FAILURE MODE: RUPTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM STORAGE TANK
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC282-0082-0001

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, HIGH TEMPERATURE, HIGH PRESSURE, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POD STRUCTURAL AND/OR TPS DAMAGE FROM POSSIBLE POD OVERPRESSURIZATION, AND DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) MC282-0082 2) 73A000014, #201 3) VS70-431099 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) JSC 12770 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 101 ABORT: 1/1

ITEM: TANK, HELIUM STORAGE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM STORAGE TANK
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC282-0082-0001

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, HIGH TEMPERATURE, HIGH PRESSURE, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) MC282-0082 2) 73A000014, #201 3) VS70-431099 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) JSC 12770 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 102

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: COUPLING, HELIUM FILL
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM FILL COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0017-0601

CAUSES: SEAL FAILURE, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MATERIAL DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) MC276-0017 2) 73A000014, #202 3) VS70-431099 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) FLIGHT RULES 6-1,A, 6-40,A,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 103 ABORT: /NA

ITEM: COUPLING, HELIUM FILL
FAILURE MODE: FAILS TO COUPLE/UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM FILL COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0017-0601

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) MC276-0017 2) 73A000014 #202 3) VS70-431099 4) JSC 11174,11.3 5) VS70-954099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 104 ABORT: /NA

ITEM: COUPLING, HELIUM FILL
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM FILL COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0017-0601

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) MC276-0017 2) 73A000014 #202 3) VS70-431099 4) JSC 11174,11.3 5) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 105 ABORT: 1/1

ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, WELD FAILURE, SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
TANK TO ISOL VALVES; REGS TO QUAD CHECK VALVES. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND POSSIBLE INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 106 ABORT: 1/1

ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
TANK TO ISOL VALVES; REGS TO QUAD CHECK VALVES. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE PROP TANK AND INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007 6) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/15/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 2/1R |
| MDAC ID: | 107 | ABORT: | 2/1R |

ITEM: VALVE, HELIUM ISOLATION
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HE ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 73P620001

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH FAILURE TO OPEN OF ONE TANK ISOL VALVE, ONE FAILURE (FAILURE TO OPEN OF THE REDUNDANT ISOL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF PRESSURIZATION SOURCE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 #203-204 2) VS70-431099 3) 73P620001 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) FLIGHT RULE 6-1,B 8) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 108 ABORT: 3/1R

ITEM: VALVE, HELIUM ISOLATION
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HE ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620001

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #203-204 2) VS70-431099 3) 73P620001 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 109 ABORT: 3/1R

ITEM: VALVE, HELIUM ISOLATION
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HE ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MATERIAL DEFECT, SEAL FAILURE, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #203-204 2) VS70-431099 3) 73P620001 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 110

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: VALVE, HELIUM ISOLATION
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HE ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P620001

CAUSES: HOUSING STRUCTURAL FAILURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, BELLOWS AND SEAL FAILURES, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 #203-204 2) VS70-431099 3) 73P620001 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 111 ABORT: 2/1R

ITEM: VALVE, HELIUM ISOLATION
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HE ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620001

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
WITH RESTRICTED FLOW IN ONE TANK ISOL VALVE, ONE FAILURE (RESTRICTED FLOW IN THE REDUNDANT ISOL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF PRESSURIZATION SOURCE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 #203-204 2) VS70-431099 3) 73P620001 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) JSC 19950 8) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 112 ABORT: 3/3

ITEM: VALVE, HELIUM ISOLATION
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HE ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P620001

CAUSES: CONTAMINATION, MATERIAL DEFECT

EFFECTS/RATIONALE:
NO EFFECT. TANK ULLAGE PRESSURE SUFFICIENT TO SUPPORT BURN WHILE VALVE OPENING. WORST CASE OF FAILURE MODE IS "FAILS TO OPEN".

REFERENCES: 1) 73A000014 #203-204 2) VS70-431099 3) 73P620001 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) JSC 19950 8) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 113 ABORT: 3/1R

ITEM: COUPLING-TEST PORT, HIGH PRESSURE HELIUM
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HIGH PRESSURE HELIUM TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: ME276-0032-0019

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LEAKAGE OF ONE LEG CAN BE ISOLATED AND OTHER LEG UTILIZED.

REFERENCES: 1) 73A000014 #225-1, 225-2 2) VS70-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 114 ABORT: /NA

ITEM: COUPLING-TEST PORT, HIGH PRESSURE HELIUM
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HIGH PRESSURE HELIUM TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0019

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #225-1, 225-2 2) VS070-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 115 ABORT: /NA

ITEM: COUPLING-TEST PORT, HIGH PRESSURE HELIUM
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HIGH PRESSURE HELIUM TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0019

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #225-1, 225-2 2) VS070-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 116 ABORT: 2/1R

ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, WELD FAILURE, SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
TANK ISOL VALVES TO REGS; TEST PORT LINES. WITH FAILURE OF ONE LINE, ONE FAILURE (REDUNDANT LEG LINE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF HELIUM PRESSURANT AND POSSIBLE INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LEAKAGE IN ONE LINE CAN BE ISOLATED AND REDUNDANT LINE UTILIZED.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 117 ABORT: 2/1R

ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
TANK ISOL VALVES TO REGS; VAPOR ISOL VALVE LEGS. WITH RESTRICTED FLOW IN ONE LEG, ONE FAILURE (RESTRICTION IN REDUNDANT LEG) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE PROP TANKS AND INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007 6) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 118 ABORT: 2/1R

ITEM: REGULATOR ASSY, HELIUM PRESSURE
FAILURE MODE: FAILS TO REGULATE (INTERNAL LEAKAGE, HIGH OUTPUT, FAILS TO LOCKUP, FAILS TO CLOSE)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE REGULATOR ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, SEAL FAILURE, PRESSURE SURGE

EFFECTS/RATIONALE:
WITH FIRST FAILURE, ONE FAILURE (SERIES REG) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE OVERPRESSURIZATION AND RUPTURE OF PROP TANKS AND LINES RESULTING IN LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. OVERPRESSURIZATION EFFECTS MAY OCCUR BEFORE CORRECTIVE ACTION (CLOSING OF TANK ISOL VALVE) CAN BE ACCOMPLISHED.

REFERENCES: 1) JSC 11174,11.3 2) 73A000014 #205, #206 3) VS70-431099 4) JSC 12770 5) VS70-943099,43AA,BA 6) JSC 19950 7) 73P620002

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 119 ABORT: 2/1R

ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE REGULATOR ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MATERIAL DEFECT

EFFECTS/RATIONALE:
WITH FIRST REGULATOR FAILED CLOSED, ONE FAILURE (FAILED CLOSED PARALLEL REG) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE PROP TANK AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174,11.3 2) 73A000014 #205, #206 3) VS70-431099 4) JSC 12770 5) VS70-943099,43AA,BA 6) FLIGHT RULE 6-1,B 7) JSC 19950 8) 73P620002

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 120 ABORT: 2/1R

ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE
FAILURE MODE: FAILS OUT OF TOLERANCE, LOW OUTPUT, REGULATES AT LOWER THAN NORMAL PRESSURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE REGULATOR ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620002

CAUSES: MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH LOW OUTPUT (<158 PSIA) FROM ONE REGULATOR, ONE FAILURE (LOW OUTPUT OR FAILED CLOSED PARALLEL REG) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE PROP TANK AND INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174,11.3 2) 73A000014 #205, #206 3) VS70-431099 4) JSC 12770 5) VS70-943099,43AA,BA 6) FLIGHT RULE 6-2 7) 73P620002

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 121 ABORT: 2/1R

ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE REGULATOR ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620002

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
WITH RESTRICTED FLOW IN FIRST REGULATOR, ONE FAILURE (RESTRICTED FLOW IN PARALLEL REG) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE PROP TANK AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174,11.3 2) 73A000014 #205, #206 3) VS70-431099 4) JSC 12770 5) VS70-943099,43AA,BA 6) FLIGHT RULE 6-1,B 7) JSC 19950 8) 73P620002

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 122 ABORT: 2/1R

ITEM: REGULATOR ASSEMBLY, HELIUM PRESSURE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE REGULATOR ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 73P620002

CAUSES: HOUSING STRUCTURAL FAILURE, AMBIENT PORT BELLOWS FAILURE, MANUFACTURING DEFECT, WELD FAILURE, MATERIAL DEFECT, SEAL FAILURES

EFFECTS/RATIONALE:
WITH EXTERNAL LEAKAGE THROUGH REGULATOR, ONE FAILURE (EXTERNAL LEAKAGE IN PARALLEL REG) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT, INABILITY TO MAINTAIN TANK PRESSURE, AND INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. SINGLE LEAK CAN BE ISOLATED AND OTHER LEG UTILIZED.

REFERENCES: 1) JSC 11174,11.3 2) 73A000014 #205, #206 3) VS70-431099 4) JSC 12770 5) VS70-943099,43AA,BA 6) JSC 19950 7) 73P620002 8) 73A620096

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 123 ABORT: 3/1R

ITEM: COUPLING-TEST PORT, VAPOR ISOLATION CHECKOUT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOLATION CHECK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: ME276-0032-0005,-0007

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A00014 #223, 224 2) MC621-0059 3) VS70-431099 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 124

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-TEST PORT, VAPOR ISOLATION CHECKOUT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOLATION CHECK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0005, -0007

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #223, 224 2) MC621-0059 3) VS70-431099 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 125 ABORT: /NA

ITEM: COUPLING-TEST PORT, VAPOR ISOLATION CHECKOUT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOLATION CHECK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0005, -0007

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #223, 224 2) MC621-0059 3) VS70-431099 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 126 ABORT: 2/1R

ITEM: VALVE, VAPOR ISOLATION-OXIDIZER
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 73P620004

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH FAILURE TO OPEN OF FIRST VALVE, ONE FAILURE (FAILURE TO OPEN OF OTHER VAPOR ISOL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE OXID TANK AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A00014 #207-1,-2 2) VS70-431099 3) 73P620004 4) JSC 12770 5) FLIGHT RULE 6-1,B 6) JSC 11174,11.3 7) VS70-943099,43AA,BA 8) TM-ES86009-43 9) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 127 ABORT: 3/1R

ITEM: VALVE, VAPOR ISOLATION-OXIDIZER
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620004

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO MIXING OF PROP OR PROP VAPORS IN HELIUM LINES RESULTING IN POSSIBLE EXPLOSION AND RUPTURE OF LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A00014 #207-1,-2 2) VS70-431099 3) 73P620004 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) TM-ES86009-43 8) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 128

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: VALVE, VAPOR ISOLATION-OXIDIZER
FAILURE MODE: INTERNAL LEAKAGE, REVERSE FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620004

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MATERIAL DEFECT, SEAL FAILURE, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO MIXING OF PROP OR PROP VAPORS IN HELIUM LINES RESULTING IN POSSIBLE EXPLOSION AND RUPTURE OF LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A00014 #207-1,-2 2) VS70-431099 3) 73P620004 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) TM-ES86009-43 8) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 129 ABORT: 1/1

ITEM: VALVE, VAPOR ISOLATION-OXIDIZER
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P620004

CAUSES: HOUSING STRUCTURAL FAILURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, BELLOWS AND SEAL FAILURES, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT, INABILITY TO REPRESSURIZE PROP TANKS, AND INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A00014 #207-1,-2 2) VS70-431099 3) 73P620004 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) TM-ES86009-43 8) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 130

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: VALVE, VAPOR ISOLATION-OXIDIZER
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P620004

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
WITH RESTRICTED FLOW IN FIRST VALVE, ONE FAILURE (RESTRICTED FLOW IN OTHER VAPOR ISOL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE OXID TANK AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A00014 #207-1,-2 2) VS70-431099 3) 73P620004 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) TM-ES86009-43 8) JSC 19950 9) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 131 ABORT: 3/3

ITEM: VALVE, VAPOR ISOLATION-OXIDIZER
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P620004

CAUSES: CONTAMINATION, MATERIAL DEFECT

EFFECTS/RATIONALE:
NO EFFECT. TANK ULLAGE PRESSURE SUFFICIENT TO SUPPORT BURN WHILE VALVE OPENING. WORST CASE OF FAILURE MODE IS "FAILS TO OPEN".

REFERENCES: 1) 73A00014 #207-1,-2 2) VS70-431099 3) 73P620004 4) JSC 12770 5) JSC 11174,11.3 6) VS70-943099,43AA,BA 7) TM-ES86009-43 8) JSC 19950 9) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 132 ABORT: 2/1R

ITEM: VALVE, QUAD CHECK VALVES
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC284-0481-0001,-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, POPPET BINDS IN GUIDE, VAPOR FREEZES UNIT, MANUFACTURE FLAW, CONTAMINATION

EFFECTS/RATIONALE:
WITH FAILURE TO OPEN OF ONE POPPET, ONE FAILURE (FAILURE TO OPEN OF PARALLEL POPPET) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF TANK REPRESSURIZATION CAPABILITY AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 #209 2) VS70-431099 3) MC284-0481 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) JSC 12770 7) JSC 18958 8) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 133 ABORT: 2/1R

ITEM: VALVE, QUAD CHECK VALVES, FUEL
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE, REVERSE FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE ASSEMBLY, FUEL
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC284-0481-0001,-0002

CAUSES: CONTAMINATION, POPPET OR POPPET SPRING BINDS, SEAT OR SEAL FRACTURE, MANUFACTURE FLAW

EFFECTS/RATIONALE:
WITH A FAILURE TO CLOSE OF ONE FUEL VALVE POPPET, ONE FAILURE (FAILURE TO CLOSE OF THE SERIES POPPET) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING OMS ENGINE OPERATIONAL PHASES. FUEL VAPORS OR LIQUID COULD MIGRATE TO UPSTREAM SIDE OF VAPOR ISLN VALVES WHERE, UPON USE OF SYSTEM, FUEL LOCATED BETWEEN REGULATOR AND VAPOR ISLN VALVES WOULD BE FORCED INTO OXID LINES AND TANK RESULTING IN POSSIBLE EXPLOSION AND RUPTURE. LOSS OF ALL REDUNDANCY ALLOWS MIXING OF PROP OR VAPORS IN LINES RESULTING IN POSSIBLE EXPLOSION AND RUPTURE OF LINES.

REFERENCES: 1) 73A000014 #209 2) VS70-431099 3) MC284-0481 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) JSC 12770 7) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 134

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: VALVE, QUAD CHECK VALVES, OXIDIZER
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE, REVERSE FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE ASSEMBLY, OXIDIZER
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC284-0481-0001,-0002

CAUSES: CONTAMINATION, POPPET OR POPPET SPRING BINDS, SEAT OR SEAL FRACTURE, MANUFACTURE FLAW

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE MIXING OF PROP VAPORS OR LIQUID IN HELIUM LINES RESULTING IN EXPLOSION AND RUPTURE.

REFERENCES: 1) 73A000014 #209 2) VS70-431099 3) MC284-0481 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) JSC 12770 7) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 135 ABORT: 1/1

ITEM: VALVE, QUAD CHECK VALVES
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0481-0001,-0002

CAUSES: HOUSING STRUCTURAL FAILURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND INABILITY TO MAINTAIN TANK PRESSURE RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. MAY ALSO ALLOW LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #209 2) VS70-431099 3) MC284-0481 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) JSC 12770 7) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 136

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: VALVE, QUAD CHECK VALVES
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0481-0001,-0002

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
TOTAL BLOCKAGE OF SINGLE INLET FILTER RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY. LOSS OF ABILITY TO PRESSURIZE TANK AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP WOULD RESULT IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 #209 2) VS70-431099 3) MC284-0481 4) JSC 11174,11.3 5) VS70-943099,43AA,BA 6) JSC 12770 7) JSC 18958 8) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 137 ABORT: 3/1R

ITEM: COUPLING-TEST PORT, QUAD CHECK VALVE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: ME276-0032-0005,-0007

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO POSSIBLE LOSS OF HELIUM PRESSURANT AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A00014 #215-1,-2, 216-1,-2 2) VS70-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 138

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-TEST PORT, QUAD CHECK VALVE
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0005,-0007

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #215-1,-2, 216-1,-2 2) VS70-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 139 ABORT: /NA

ITEM: COUPLING-TEST PORT, QUAD CHECK VALVE
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) QUAD CHECK VALVE TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0005,-0007

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #215-1,-2, 216-1,-2 2) VS70-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 140

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: LINES AND MECHANICAL FITTINGS-HELIUM PRESSURE
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) HE PRESS SUBSYSTEM
4) HELIUM PRESSURE LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
COUPLING LINES. NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 141 ABORT: 1/1

ITEM: VALVE-PRESSURE RELIEF ASSEMBLY
FAILURE MODE: FAILS OUT OF TOLERANCE, FAILS TO OPEN, BURST DISK FAILS TO RUPTURE, RELIEF VALVE FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PRESSURE RELIEF ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0421-0015,-0016

CAUSES: MANUFACTURING DEFECT, MATERIAL DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #213, 214 2) VS70-431099 3) MC284-0421 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 142

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: VALVE-PRESSURE RELIEF ASSEMBLY
FAILURE MODE: FAILS OUT OF TOLERANCE, BURST DISK RUPTURES AT LOWER THAN BURST PRESSURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PRESSURE RELIEF ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC284-0421-0015,-0016

CAUSES: MATERIAL DEFECT, MANUFACTURING DEFECT, PRESSURE SURGE

EFFECTS/RATIONALE:
WITH PREMATURE RUPTURE OF BURST DISK, ONE FAILURE (PREMATURE OPENING, FAILURE TO CLOSE, OR INTERNAL LEAKAGE OF RELIEF VALVE) AWAY FROM POSSIBLE LOSS LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND HELIUM THROUGH ASSY. LOSS OF HELIUM PRESSURANT, INABILITY TO MAINTAIN TANK PRESSURE, AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULT IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #213, 214 2) VS70-431099 3) MC284-0421 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 143 ABORT: 2/1R

ITEM: VALVE-PRESSURE RELIEF ASSEMBLY
FAILURE MODE: BURST DISK LEAK, INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PRESSURE RELIEF ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC284-0421-0015,-0016

CAUSES: MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH LEAKAGE OF BURST DISK, ONE FAILURE (PREMATURE OPENING OR INTERNAL LEAKAGE OF RELIEF VALVE) AWAY FROM POSSIBLE LOSS LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND HELIUM THROUGH ASSEMBLY. LOSS OF HELIUM PRESSURANT, INABILITY TO MAINTAIN TANK PRESSURE, AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULT IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #213, 214 2) VS70-431099 3) MC284-0421 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 144 ABORT: 1/1

ITEM: VALVE-PRESSURE RELIEF ASSEMBLY
FAILURE MODE: FAILS TO CLOSE, RELIEF VALVE FAILS TO RESEAT (OPENS AFTER BURST DISK RUPTURE)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PRESSURE RELIEF ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0421-0015,-0016

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE CAUSES POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROPELLANT AND HELIUM PRESSURANT RESULTING IN INABILITY TO MAINTAIN TANK PRESSURE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP CAUSING POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #213, 214 2) VS70-431099 3) MC284-0421 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 145 ABORT: 1/1

ITEM: VALVE-PRESSURE RELIEF ASSEMBLY
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PRESSURE RELIEF ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0421-0015,-0016

CAUSES: HOUSING STRUCTURAL FAILURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE CAUSES POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROPELLANT AND HELIUM PRESSURANT RESULTING IN INABILITY TO MAINTAIN TANK PRESSURE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP CAUSING POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #213, 214 2) VS70-431099 3) MC284-0421 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 146

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: COUPLING-TEST PORT, PRESSURE RELIEF VALVE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) RELIEF VALVE TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: ME276-0032-0005,-0007

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND HELIUM PRESSURANT, INABILITY TO MAINTAIN TANK PRESSURE, AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #215-3, 216-3 2) VS70-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 147 ABORT: /NA

ITEM: COUPLING-TEST PORT, PRESSURE RELIEF VALVE
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) RELIEF VALVE TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0005,-0007

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #215-3, 216-3 2) VS70-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 148

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-TEST PORT, PRESSURE RELIEF VALVE
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) RELIEF VALVE TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0005,-0007

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #215-3, 216-3 2) VS70-431099 3) MC621-0059 4) ME276-0032 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 149 ABORT: 1/1

ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) MMH AND NTO PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
RELIEF VALVE INLET AND OUTLET LINES. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANK AND LINES RESULTING IN LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 150

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: COUPLING-TEST PORT, PROPELLANT PRESSURE CHECK
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT PRESSURE CHECK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3801,-3851

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF FIRST SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND HELIUM PRESSURANT, INABILITY TO MAINTAIN TANK ULLAGE PRESSURE, AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #217, 218 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 151 ABORT: /NA

ITEM: COUPLING-TEST PORT, PROPELLANT PRESSURE CHECK
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT PRESSURE CHECK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3801,-3851

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #217, 218 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 152

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-TEST PORT, PROPELLANT PRESSURE CHECK
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT PRESSURE CHECK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3801,-3851

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #217, 218 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 153 ABORT: 1/1

ITEM: VALVE-GROUND, MANUAL ISOLATION
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GROUND MANUAL ISOLATION VALVE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0480-0001,-0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE PROP TANK AND INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 #211, #212 2) VS70-431099 3) MC284-480 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 154

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: VALVE-GROUND, MANUAL ISOLATION
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE, FAILS TO REMAIN CLOSED, FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GROUND MANUAL ISOLATION VALVE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0480-0001,-0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #211, #212 2) VS70-431099 3) MC284-480 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 155 ABORT: 1/1

ITEM: VALVE-GROUND, MANUAL ISOLATION
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GROUND MANUAL ISOLATION VALVE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0480-0001,-0002

CAUSES: HOUSING STRUCTURAL FAILURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, BELLOWS FAILURE, SEAL FAILURES, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT AND INABILITY TO MAINTAIN TANK PRESSURE RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. MAY ALSO ALLOW LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #211, #212 2) VS70-431099 3) MC284-480 4) VS70-943099,43AA,BA 5) JSC 11174,11.3 6) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 156

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: COUPLING-TANK VENT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK VENT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3802,-3852

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF FIRST SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND HELIUM PRESSURANT, INABILITY TO MAINTAIN TANK PRESSURE, AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #219, 220 2) VS70-431099 3) MC276-0018 4)JSC 11174,11.3 5) VS70-943099,43AA,BA 6) MC621-0059

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 157 ABORT: /NA

ITEM: COUPLING-TANK VENT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK VENT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3802,-3852

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #219, 220 2) VS70-431099 3) MC276-0018 4)JSC 11174,11.3 5) VS70-943099,43AA,BA 6) MC621-0059

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 158

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-TANK VENT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK VENT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3802,-3852

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #219, 220 2) VS70-431099 3) MC276-0018 4)JSC 11174,11.3 5) VS70-943099,43AA,BA 6) MC621-0059

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 159 ABORT: 1/1

ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) MMH AND NTO PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
QUAD CHECK VALVES TO TANK; TANK TO ISOL VALVE LEGS; ISOL VALVE LEGS TO XFEED LINE CONNECTION. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 160

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
LOCATED BETWEEN GROUND MANUAL ISOL VALVE AND PROP TANK. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #267 2) VS70-431099 3) VS70-943099,43AA,BA 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/16/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 1/1 |
| MDAC ID: | 161 | ABORT: | 1/1 |

ITEM: GIMBAL BELLOWS
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
LOCATED BETWEEN GROUND MANUAL ISOL VALVE AND PROP TANK. FAILURE OF A BELLOWS TO PROVIDE ANGULAR COMPENSATION FOR LINE MOVEMENTS COULD RESULT IN POSSIBLE LINE RUPTURE RESULTING IN LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #267 2) VS70-431099 3) VS70-943099,43AA,BA 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 162

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOCATED BETWEEN GROUND MANUAL ISOL VALVE AND PROP TANK. FLOW RESTRICTION IN BELLOWS AT THIS LOCATION IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO MAINTAIN TANK PRESSURE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #267 2) VS70-431099 3) VS70-943099,43AA,BA 4) 73P550015 5) FLIGHT RULE 6-1,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 163

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: PROPELLANT TANK
FAILURE MODE: RUPTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550013

CAUSES: STRUCTURAL FAILURE, HIGH PRESSURE, SEAL FAILURES, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING, HIGH PROP LOAD DURING ENTRY

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. RUPTURE RESULTS IN LOSS OF PROPELLANT, POSSIBLE POD STRUCTURAL DAMAGE, CORROSIVE EFFECTS ON POD COMPONENTS, POSSIBLE FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #251, 252 2) VS70-431099 3) 73P550013 4) MC621-0059 5) 73A740000 6) JSC 11174,11.3 7) VS70-943099,43AA,BA 8) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/09/86
SUBSYSTEM: OMS
MDAC ID: 164

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: PROPELLANT TANK
FAILURE MODE: STRUCTURAL FAILURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550013

CAUSES: STRUCTURAL FAILURE, HIGH PRESSURE, SEAL FAILURES, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING, HIGH PROP LOAD DURING ENTRY

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. RUPTURE RESULTS IN LOSS OF PROPELLANT, CORROSIVE EFFECTS ON POD COMPONENTS, POSSIBLE FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #251, 252 2) VS70-431099 3) 73P550013 4) MC621-0059 5) 73A740000 6) JSC 11174,11.3 7) VS70-943099,43AA,BA 8) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 165 ABORT: 2/1R

ITEM: COUPLING-PROP TANK, HORIZONTAL DRAIN PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK HORIZONTAL DRAIN PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3801,-3851

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND HELIUM PRESSURANT, INABILITY TO MAINTAIN TANK ULLAGE PRESSURE, AND INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #237, 238 2) VS70-431099 3) 73P550003 4) MC621-0059 5) MC276-0018 6) JSC 11174,11.3 7) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 166

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-PROP TANK, HORIZONTAL DRAIN PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK HORIZONTAL DRAIN PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3801,-3851

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #237, 238 2) VS70-431099 3) 73P550003 4) MC621-0059 5) MC276-0018 6) JSC 11174,11.3 7) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 167 ABORT: /NA

ITEM: COUPLING-PROP TANK, HORIZONTAL DRAIN PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK HORIZONTAL DRAIN PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3801,-3851

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #237, 238 2) VS70-431099 3) 73P550003 4) MC621-0059 5) MC276-0018 6) JSC 11174,11.3 7) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 168

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: COUPLING-TANK ACQ. SYSTEM TRAP FILL/VENT PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) TANK ACQ. SYSTEM TRAP FILL/VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND LOSS OF HELIUM PRESSURANT CAUSING INABILITY TO MAINTAIN TANK PRESSURE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A00014 #239, 240 2) VS70-431099 3) 73P550013 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 169 ABORT: /NA

ITEM: COUPLING-TANK ACQ. SYSTEM TRAP FILL/VENT PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) TANK ACQ. SYSTEM TRAP FILL/VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #239, 240 2) VS70-431099 3) 73P550013 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 170

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-TANK ACQ. SYSTEM TRAP FILL/VENT PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) TANK ACQ. SYSTEM TRAP FILL/VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #239, 240 2) VS70-431099 3) 73P550013 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 171 ABORT: 2/1R

ITEM: COUPLING-TANK ACQ. SYSTEM FILL/VENT PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) TANK ACQ. SYSTEM FILL/VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND LOSS OF HELIUM PRESSURANT CAUSING INABILITY TO MAINTAIN TANK PRESSURE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. LEAKAGE OF PROP RESULTS IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A00014 #226, 227 2) VS70-431099 3) 73P550013 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 172 ABORT: /NA

ITEM: COUPLING-TANK ACQ. SYSTEM FILL/VENT PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) TANK ACQ. SYSTEM FILL/VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #226, 227 2) VS70-431099 3) 73P550013 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 173 ABORT: /NA

ITEM: COUPLING-TANK ACQ. SYSTEM FILL/VENT PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) TANK ACQ. SYSTEM FILL/VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A00014 #226, 227 2) VS70-431099 3) 73P550013 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 174

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: COUPLING-PROPELLANT, TANK TEST PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 #215-4, 216-4 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 175 ABORT: /NA

ITEM: COUPLING-PROPELLANT, TANK TEST PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #215-4, 216-4 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 176

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-PROPELLANT, TANK TEST PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT TANK TEST PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 #215-4, 216-4 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,43AA,BA

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 177 ABORT: 3/3

ITEM: GAGING PROBE, FORWARD COMPARMENT
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) FORWARD COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MISHANDLING, LOSS OF INPUT POWER, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
LOSS OF OUTPUT IS NO EFFECT. REDUNDANCY IS PROVIDED BY ABILITY TO USE PVT METHOD TO DETERMINE TOTAL PROP QUANTITY. OMS PROPELLANT QUANTITIES ARE ALSO TRACKED BY GROUND PERSONNEL BASED ON ENGINE PERFORMANCE PARAMETERS AND FIRING DURATION.

REFERENCES: 1) VS70-431099 #253, 254 2) 73A000014 3) 73P880001 4) JSC 19950 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 178

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: GAGING PROBE, FORWARD COMPARMENT
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) FORWARD COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MISHANDLING, IMPROPER INPUT, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
ERRONEOUS INDICATION IS NO EFFECT. REDUNDANCY IS PROVIDED BY ABILITY TO USE PVT METHOD TO DETERMINE TOTAL PROP QUANTITY. OMS PROPELLANT QUANTITIES ARE ALSO TRACKED BY GROUND PERSONNEL BASED ON ENGINE PERFORMANCE PARAMETERS AND FIRING DURATION.

REFERENCES: 1) VS70-431099 #253, 254 2) 73A000014 3) 73P880001 4) JSC 19950 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 179 ABORT: 3/3

ITEM: GAGING PROBE, FORWARD COMPARMENT
FAILURE MODE: ERRATIC OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) FORWARD COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MISHANDLING, IMPROPER INPUT, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
ERRATIC OPERATION IS NO EFFECT. REDUNDANCY IS PROVIDED BY ABILITY TO USE PVT METHOD TO DETERMINE TOTAL PROP QUANTITY. OMS PROPELLANT QUANTITIES ARE ALSO TRACKED BY GROUND PERSONNEL BASED ON ENGINE PERFORMANCE PARAMETERS AND FIRING DURATION.

REFERENCES: 1) VS70-431099 #253, 254 2) 73A000014 3) 73P880001 4) JSC 19950 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 180

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: GAGING PROBE, FORWARD COMPARMENT, FUEL
FAILURE MODE: STRUCTURAL FAILURE, GLASS TUBE FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) FORWARD COMPARTMENT GAGING PROBE, FUEL
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: IMPROPER INSTALLATION, STRUCTURAL FAILURE, MATERIAL DEFECT

EFFECTS/RATIONALE:
NO EFFECT. FULL SCALE HIGH READING. GLASS FRAGMENTS NOT SUFFICIENT TO RESTRICT FLOW OF PROP THROUGH COMMUNICATION SCREEN. CONFINEMENT OF ALL BUT SMALL GLASS FRAGMENTS WITHIN PROBE HOUSING AND LOW G FORCES PRECLUDE DAMAGE TO COMMUNICATION SCREENS.

REFERENCES: 1) VS70-431099 #253, 254 2) 73A000014 3) 73P880001 4) JSC 19950 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 181 ABORT: 3/3

ITEM: GAGING PROBE, FORWARD COMPARMENT
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) FORWARD COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: BELLOWS FAILURE, BARRIER AND SEAL FAILURES, MANUFACTURING DEFECT, MATERIAL DEFECT

EFFECTS/RATIONALE:
LEAKAGE THROUGH SEAL ALLOWS LEAKAGE OF PROP INTO ELECTRICAL CAVITY RESULTING IN POSSIBLE LOSS OF OR ERRONEOUS PROBE OUTPUT. REDUNDANCY IS PROVIDED BY ABILITY TO USE PVT METHOD TO DETERMINE TOTAL PROP QUANTITY. OMS PROPELLANT QUANTITIES ARE ALSO TRACKED BY GROUND PERSONNEL BASED ON ENGINE PERFORMANCE PARAMETERS AND FIRING DURATION.

REFERENCES: 1) VS70-431099 #253, 254 2) 73A000014 3) 73P880001 4) JSC 19950 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 182

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: GAGING PROBE, AFT COMPARTMENT
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) AFT COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MISHANDLING, LOSS OF INPUT POWER, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
LOSS OF OUTPUT IS NO EFFECT. LOSS OF LOW QUANTITY WARNING COULD ALLOW HELIUM INGESTION AND PROP DEPLETION, HOWEVER PROP MANAGEMENT AND TRACKING IS SUCH THAT UNEXPECTED/UNDESIRED DEPLETION OF PROP IS UNCREDIBLE. LOSS OF OUTPUT COULD ALLOW FAILURE OF COMMUNICATION SCREEN AND PASSAGE OF HELIUM INTO AFT COMPARTMENT TO GO UNDETECTED (REQUIRES MULTIPLE FAILURES). REDUNDANCY PROVIDED BY PVT METHOD AND GROUND TRACKING.

REFERENCES: 1) VS70-431099 #250, 249 2) 73P880001 3) JSC 19950 4) 73A00014 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 183

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: GAGING PROBE, AFT COMPARTMENT
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) AFT COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MISHANDLING, IMPROPER INPUT, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
ERRONEOUS INDICATION OF PROP QUANTITY OR LOW LEVEL QUANTITY IS NO EFFECT. PROP MANAGEMENT AND TRACKING IS SUCH THAT ACTUAL PROP QUANTITY IS KNOWN. ERRONEOUS INDICATION OF COMMUNICATION SCREEN FAILURE AND HELIUM PASSAGE (LESS THAN FULL AFT COMPARTMENT READING WITH PROP REMAINING IN FORWARD COMPARTMENT) MAY RESULT IN PERFORMANCE OF ULLAGE BURNS PRIOR TO OMS BURNS AND POSSIBLE LOSS OF ON-ORBIT INTERCONNECT FROM AFFECTED TANK.

REFERENCES: 1) VS70-431099 #250, 249 2) 73P880001 3) JSC 19950 4) 73A00014 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 184

| HIGHEST CRITICALITY | HDW/FUNC |
|---|---|
| FLIGHT: | 3/3 |
| ABORT: | 3/3 |

ITEM: GAGING PROBE, AFT COMPARTMENT
FAILURE MODE: ERRATIC OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) AFT COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MISHANDLING, IMPROPER INPUT, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE

EFFECTS/RATIONALE:
ERRATIC OPERATION IS NO EFFECT. LOSS OF LOW QUANTITY WARNING COULD ALLOW HELIUM INGESTION AND PROP DEPLETION, HOWEVER PROP MANAGEMENT AND TRACKING IS SUCH THAT UNEXPECTED/UNDESIRED DEPLETION OF PROP IS UNCREDIBLE. LOSS OF OUTPUT COULD ALLOW FAILURE OF COMMUNICATION SCREEN AND PASSAGE OF HELIUM INTO AFT COMPARTMENT TO GO UNDETECTED (REQUIRES MULTIPLE FAILURES). REDUNDANCY PROVIDED BY PVT METHOD AND GROUND TRACKING.

REFERENCES: 1) VS70-431099 #250, 249 2) 73P880001 3) JSC 19950 4) 73A00014 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 185 ABORT: 3/3

ITEM: GAGING PROBE, AFT COMPARTMENT, FUEL
FAILURE MODE: STRUCTURAL FAILURE, GLASS TUBE FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) AFT COMPARTMENT GAGING PROBE, FUEL
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: IMPROPER INSTALLATION, STRUCTURAL FAILURE, MATERIAL DEFECT

EFFECTS/RATIONALE:
NO EFFECT. FULL SCALE HIGH READING. GLASS FRAGMENTS NOT SUFFICIENT TO RESTRICT FLOW OF PROP THROUGH GALLERY SCREENS. CONFINEMENT OF ALL BUT SMALL GLASS FRAGMENTS WITHIN PROBE OUTER HOUSING AND LOW G FORCES PRECLUDE DAMAGE TO SCREENS.

REFERENCES: 1) VS70-431099 #250, 249 2) 73P880001 3) JSC 19950 4) 73A00014 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 186

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: GAGING PROBE, AFT COMPARTMENT
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) AFT COMPARTMENT GAGING PROBE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: BELLOWS FAILURE, BARRIER AND SEAL FAILURES, MANUFACTURING DEFECT, MATERIAL DEFECT

EFFECTS/RATIONALE:
LEAKAGE THROUGH SEAL ALLOWS LEAKAGE OF PROP INTO ELECTRICAL CAVITY RESULTING IN POSSIBLE LOSS OF OR ERRONEOUS PROBE OUTPUT. REDUNDANCY IS PROVIDED BY ABILITY TO USE PVT METHOD TO DETERMINE TOTAL PROP QUANTITY. OMS PROPELLANT QUANTITIES ARE ALSO TRACKED BY GROUND PERSONNEL BASED ON ENGINE PERFORMANCE PARAMETERS AND FIRING DURATION.

REFERENCES: 1) VS70-431099 #250, 249 2) 73P880001 3) JSC 19950 4) 73A00014 5) JSC 18958 6) JSC 12770 7) JSC 11174,11.2 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 187 ABORT: 3/3

ITEM: TOTALIZER
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) TOTALIZER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: LOSS OF INPUT POWER, CONTAMINATION, MANUFACTURING DEFECT, MISHANDLING, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF OUTPUT IS NO EFFECT. LOSS OF LOW QUANTITY WARNING COULD ALLOW HELIUM INGESTION AND PROP DEPLETION, HOWEVER PROP MANAGEMENT AND TRACKING IS SUCH THAT UNEXPEXTED/UNDESIRED DEPLETION OF PROP IS UNCREDIBLE. LOSS OF OUTPUT COULD ALLOW FAILURE OF COMMUNICATION SCREEN AND PASSAGE OF HELIUM INTO AFT COMPARTMENT TO GO UNDETECTED (REQUIRES MULTIPLE FAILURES).

REFERENCES: 1) 73P880001 2) JSC 12770 3) JSC 11174,11.2 4) JSC 19950 5) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 188

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: TOTALIZER
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) TOTALIZER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: IMPROPER INPUT, CONTAMINATION, MANUFACTURING DEFECT, MISHANDLING, PIECE-PART FAILURE

EFFECTS/RATIONALE:
ERRONEOUS INDICATIONS OF PROP QUANTITY OR LOW LEVEL QUANTITY ARE NO EFFECT. PROP MANAGEMENT AND TRACKING IS SUCH THAT ACTUAL PROP QUANTITY IS KNOWN. ERRONEOUS INDICATION OF COMMUNICATION SCREEN FAILURE AND PASSAGE OF HELIUM WOULD RESULT IN THE PERFORMANCE OF ULLAGE BURNS PRIOR TO OMS BURNS AND POSSIBLE LOSS OF INTERCONNECT CAPABILITY FROM AFFECTED TANK.

REFERENCES: 1) 73P880001 2) JSC 12770 3) JSC 11174,11.2 4) JSC 19950 5) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 189 ABORT: 3/3

ITEM: TOTALIZER
FAILURE MODE: ERRATIC OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GAGING ASSEMBLY
5) TOTALIZER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P880001

CAUSES: IMPROPER INPUT, CONTAMINATION, MANUFACTURING DEFECT, MISHANDLING, PIECE-PART FAILURE

EFFECTS/RATIONALE:
ERRATIC OPERATION IS NO EFFECT. LOSS OF LOW QUANTITY WARNING COULD ALLOW HELIUM INGESTION AND PROP DEPLETION, HOWEVER PROP MANAGEMENT AND TRACKING IS SUCH THAT UNEXPECTED/UNDESIRED DEPLETION OF PROP IS UNCREDIBLE. LOSS OF OUTPUT COULD ALLOW FAILURE OF COMMUNICATION SCREEN AND PASSAGE OF HELIUM INTO AFT COMPARTMENT TO GO UNDETECTED (REQUIRES MULTIPLE FAILURES).

REFERENCES: 1) 73P880001 2) JSC 12770 3) JSC 11174,11.2 4) JSC 19950 5) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 190

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 2/2

ITEM: COMMUNICATION SCREEN
FAILURE MODE: STRUCTURAL FAILURE, LOSS OF RETENTION CAPABILITY

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) COMMUNICATION SCREEN
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 2/2 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73B740001

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE, MISHANDLING

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF MISSION. MIGRATION OF PROP OUT OF AFT COMPARTMENT COULD RESULT IN HELIUM INGESTION UPON ENGINE START CAUSING POSSIBLE DAMAGE TO AND LOSS OF ENGINE. SETTLING BURN REQUIRED PRIOR TO FURTHER USE OF AFFECTED SYSTEM. NO EFFECT FOR RTLS AND TAL SINCE PROP FORCED INTO AFT COMPARTMENT AT START OF PROP DUMP.

REFERENCES: 1) 73B740001 2) 73A740000 3) JSC 12770 4) JSC 18958 6) FLIGHT RULES 6-2,C, 6-44 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 191 ABORT: 3/1R

ITEM: COMMUNICATION SCREEN
FAILURE MODE: STRUCTURAL FAILURE, HELIUM PASSAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) COMMUNICATION SCREEN
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73B740001

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE, MISHANDLING

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNANCY RESULTS IN POSSIBLE LOSS OF MISSION DUE TO POSSIBLE DAMAGE TO AND LOSS OF ONE ENGINE. A SETTLING BURN WOULD BE REQUIRED PRIOR TO FURTHER USE OF AFFECTED TANK. LOSS OF ALL REDUNDANCY DURING RTLS OR TAL ABORT IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73B740001 2) 73A740000 3) JSC 12770 4) JSC 18958 6) FLIGHT RULES 6-2,C, 6-44 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 192

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 2/1R

ITEM: GALLERY LEGS
FAILURE MODE: STRUCTURAL FAILURE, HELIUM PASSAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) GALLERY LEGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73B740004

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE, MISHANDLING

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY RESULTS IN POSSIBLE LOSS OF MISSION DUE TO POSSIBLE DAMAGE TO AND LOSS OF ONE ENGINE. A SETTLING BURN WOULD BE REQUIRED PRIOR TO FURTHER USE OF AFFECTED TANK. WITH FAILURE OF GALLERY LEG SCREEN DURING RTLS OR TAL ONE FAILURE (MANIFOLD SCREEN) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A740066 2) 73B740004 3) 73A740000 4) JSC 12770 5) JSC 18958 6) FLIGHT RULES 6-2,C, 6-44

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 193 ABORT: 2/1R

ITEM: COLLECTOR MANIFOLD
FAILURE MODE: STRUCTURAL FAILURE, HELIUM PASSAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT ACQUISITION ASSEMBLY
5) COLLECTOR MANIFOLD
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73B740003

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MATERIAL DEFECT, WELD FAILURE, MISHANDLING

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY RESULTS IN POSSIBLE LOSS OF MISSION DUE TO POSSIBLE DAMAGE TO AND LOSS OF ONE ENGINE. A SETTLING BURN WOULD BE REQUIRED PRIOR TO FURTHER USE OF AFFECTED TANK. WITH FAILURE OF MANIFOLD SCREEN DURING RTLS OR TAL, ONE FAILURE (GALLERY LEG SCREEN) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A740066 2) 73B740004 3) 73A740000 4) JSC 12770 5) JSC 18958 6) FLIGHT RULES 6-2,C, 6-44

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 194

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) MMH AND NTO PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, WELD FAILURE, SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
ALL PROP LINES AND MECHANICAL FITTINGS. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP INTO POD RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 195 ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
LOCATED BETWEEN PROP TANK AND TANK ISOL VALVES. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #268 2) VS70-431099 3) VS70-943099,43AA,BA 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 196

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
LOCATED BETWEEN PROP TANK AND TANK ISOL VALVES. FAILURE OF A BELLOWS TO PROVIDE ANGULAR COMPENSATION FOR PROP LINE MOVEMENTS COULD RESULT IN POSSIBLE LINE RUPTURE, LOSS AND LEAKAGE OF PROP INTO POD, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #268 2) VS70-431099 3) VS70-943099,43AA,BA 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 197 ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOCATED BETWEEN PROP TANK AND TANK ISOL VALVES. RESTRICTION IN BELLOWS AT THIS LOCATION IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #268 2) VS70-431099 3) VS70-943099,43AA,BA 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 198

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0023,-0024

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING

EFFECTS/RATIONALE:
WITH FAILURE TO OPEN OF ONE TANK ISLN VALVE, ONE FAILURE (FAILURE TO OPEN OF OTHER VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BB 7) JSC 12770 8) TM-ES86009-43 9) FLIGHT RULE 6-2,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 199 ABORT: 3/3

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0430-0023,-0024

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. VALVES ARE NORMALLY OPEN DURING ALL PHASES. A FAILED OPEN VALVE COULD RESULT IN LOSS OF CROSSFEED CAPABILITY TO AFFECTED POD (TO AVOID DIRECT CONNECTION OF TANKS).

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BB 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 200

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: FAILS MIDTRAVEL, PARTIALLY OPEN/CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0023,-0024

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING

EFFECTS/RATIONALE:
WITH ONE VALVE FAILED MIDTRAVEL, ONE FAILURE (FAILURE TO OPEN OF OTHER VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. FLOW RATE INSUFFICIENT TO SUPPORT BURN MAKES PROP IN AFFECTED TANK UNUSABLE. VALVE FAILED PARTIALLY OPEN COULD RESULT IN LOSS OF CROSSFEED CAPABILITY TO AFFECTED POD (TO AVOID DIRECT CONNECTION TO TANKS).

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BA 7) JSC 12770 8) TM-ES86009-43 9) FLIGHT RULE 6-2,B,D

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 201 ABORT: 3/3

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: INTERNAL LEAKAGE, FORWARD/REVERSE LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0430-0023,-0024

CAUSES: PIECE-PART STRUCTURAL FAILURE, BALL SEAL FAILURES, RELIEF VALVE SEAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. INTERNAL LEAKAGE OF VALVE MAY ALLOW CONNECTION OF TANKS AT DIFFERENT PRESSURES DURING CROSSFEED OPS HOWEVER CONNECTION THROUGH CLOSED LEAKING VALVE PRECLUDES DAMAGE TO TANK FROM PRESSURE SURGE.

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BA 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 202

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0430-0023,-0024

CAUSES: HOUSING STRUCTURAL FAILURE, BELLOWS AND SEAL FAILURES, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP INTO POD RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BB 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 203 ABORT: 2/1R

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
WITH RESTRICTED FLOW IN ONE VALVE, ONE FAILURE (FAILURE TO OPEN OR RESTRICTED FLOW IN OTHER VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. FLOW RATE INSUFFICIENT TO SUPPORT BURN MAKES PROP IN AFFECTED TANK UNUSABLE.

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BB 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 204

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0023,-0024

CAUSES: IMPROPER INPUT, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
VALVES ARE NORMALLY IN OPEN POSITION. FIRST FAILURE IS NO EFFECT. WITH VALVE SWITCH IN GPC POSITION (TO OPEN VALVE AT START OF BURN), LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO POSSIBLE LOSS OF ONE ENGINE. INITIAL LOW PROP FLOW RATE COULD LEAD TO POSSIBLE DAMAGE TO AND LOSS OF ENGINE. PROP FROM AFFECTED TANK CAN BE USED BY OTHER ENGINE WHEN VALVE REACHES OPEN POSITION. VALVES OPEN FOR ABORT DUMPS.

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BB 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 205 ABORT: 2/1R

ITEM: VALVE-PROPELLANT TANK ISOLATION
FAILURE MODE: FAILS OUT OF TOLERANCE, RELIEF VALVE FAILS TO RELIEVE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 3/3 |
| LIFTOFF: | 2/1R | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0023,-0024

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH FAILURE OF RELIEF DEVICE IN ONE VALVE, ONE FAILURE (RELIEF DEVICE IN PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE RUPTURE OF DOWNSTREAM LINES AND LOSS AND LEAKAGE OF PROP INTO POD RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. VALVES OPEN FOR ABORTS.

REFERENCES: 1) 73A000014, #257-1,-2, 258-1,-2 2) VS70-431099 3) MC284-0430 4) JSC 18958 5) JSC 11174,11.3 6) VS70-943099,43AB,BB 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 206 ABORT: 2/1R

ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) MMH AND NTO PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
TANK ISOL VALVE LEGS. WITH RESTRICTED FLOW IN ONE LEG, ONE FAILURE (REDUNDANT LEG RESTRICTION) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 207 ABORT: 2/1R

ITEM: COUPLING - PROPELLANT LOW-POINT DRAIN
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT LOW-POINT DRAIN COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) MC621-0059 2) MC276-0018 3) JSC 11174,11.3 4) VS70-943099,AC,BC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 208

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING - PROPELLANT LOW-POINT DRAIN
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT LOW-POINT DRAIN COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) MC621-0059 2) MC276-0018 3) JSC 11174,11.3 4) VS70-943099,AC,BC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 209 ABORT: /NA

ITEM: COUPLING - PROPELLANT LOW-POINT DRAIN
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT LOW-POINT DRAIN COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) MC621-0059 2) MC276-0018 3) JSC 11174,11.3 4) VS70-943099,AC,BC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 210

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: COUPLING-OMS/RCS PROPELLANT FILL PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OMS/RCS PROPELLANT FILL PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-2601,-2651

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) VS70-431099 2) MC276-0018 3) JSC 11174,11.3 4) VS70-943099, 43AC,BC 5) MC621-0059 6) 73A000014, #119,120

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 211 ABORT: /NA

ITEM: COUPLING-OMS/RCS PROPELLANT FILL PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OMS/RCS PROPELLANT FILL PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-2601,-2651

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) VS70-431099 2) MC276-0018 3) JSC 11174,11.3 4) VS70-943099, 43AC,BC 5) 73A000014, #119,120 6) MC621-0059

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 212 ABORT: /NA

ITEM: COUPLING-OMS/RCS PROPELLANT FILL PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OMS/RCS PROPELLANT FILL PORT COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-2601,-2651

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) VS70-431099 2) MC276-0018 3) JSC 11174,11.3 4) VS70-943099, 43AC,BC 5) 73A000014, #119,120 6) MC621-0059

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 213 ABORT: 2/1R

ITEM: COUPLING - PROPELLANT GROUND-PURGE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GROUND-PURGE COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3803,-3853

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #235, 236 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,AC,BC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 214

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING - PROPELLANT GROUND-PURGE
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GROUND-PURGE COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3803,-3853

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #235, 236 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,AC,BC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 215 ABORT: /NA

ITEM: COUPLING - PROPELLANT GROUND-PURGE
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) PROPELLANT GROUND-PURGE COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3803,-3853

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #235, 236 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) JSC 11174,11.3 6) VS70-943099,AC,BC

C-3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 216

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: CROSSFEED GIMBAL JOINT
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED GIMBAL JOINT
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME271-0092-0004,-0005

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. LOCATED ON CROSSFEED LINE IN AFT BODY.

REFERENCES: 1) VS70-431099, #345-348 2) ME271-0092

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 217 ABORT: 1/1

ITEM: CROSSFEED GIMBAL JOINT
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED GIMBAL JOINT
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME271-0092-0004,-0005

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
FAILURE OF BELLOWS TO PROVIDE ANGULAR COMPENSATION FOR PROP LINE MOVEMENTS COULD RESULT IN LINE RUPTURE, LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. LOCATED ON CROSSFEED LINE IN AFT BODY.

REFERENCES: 1) VS70-431099, #345-348 2) ME271-0092

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 218 ABORT: 1/1

ITEM: CROSSFEED GIMBAL JOINT
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED GIMBAL JOINT
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 1/1 | ATO: | 2/2 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME271-0092-0004,-0005

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. RESTRICTED FLOW IN CROSSFEED PATH DURING A CROSSFEED OMS BURN COULD REULT IN DAMAGE TO AND LOSS OF AFFECTED ENGINE DUE TO IMPROPER MIXTURE RATIO. PROP IN POD WITH AFFECTED ENGINE SUBSEQUENTLY STRANDED DUE TO LOSS OF CROSSFEED PATH RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. FAILURE NOT DETECTABLE UNTIL EFFECTS MANIFESTED. LOCATED ON XFEED LINE IN AFT BODY.

REFERENCES: 1) VS70-431099, #345-348 2) ME271-0092 3) FLIGHT RULE 6-95,C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 219 ABORT: 1/1

ITEM: FLEXIBLE LINE ASSEMBLY
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) FLEXIBLE LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC271-0082-0001,-0002,-0003,-0004

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, . MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. LOCATED ON CROSSFEED LINE IN AFT BODY.

REFERENCES: 1) 73A000014, #345-348 2) VS70-943099,43AJ 3) VO70-435011

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 220

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: FLEXIBLE LINE ASSEMBLY
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) FLEXIBLE LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 1/1 | ATO: | 2/2 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC271-0082-0001,-0002,-0003,-0004

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. RESTRICTED FLOW IN CROSSFEED PATH DURING A CROSSFEED OMS BURN COULD REULT IN DAMAGE TO AND LOSS OF AFFECTED ENGINE DUE TO IMPROPER MIXTURE RATIO. PROP IN POD WITH AFFECTED ENGINE SUBSEQUENTLY STRANDED DUE TO LOSS OF CROSSFEED PATH RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. FAILURE NOT DETECTABLE UNTIL EFFECTS MANIFESTED.

REFERENCES: 1) 73A000014, #345-348 2) VS70-943099,43AJ 3) VO70-435011 4) FLIGHT RULE 6-95,C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 221 ABORT: 2/1R

ITEM: CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
XFEED VALVE LEGS; INTERCONNECT VALVE LEGS. FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (RESTRICTION IN REDUNDANT LEG) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF INTERCONNECT CAPABILITY AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007 6) FLIGHT RULES 6-9,B, 6-95,B

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 222 ABORT: 1/1

ITEM: CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 1/1 | ATO: | 2/2 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
XFEED LINES. FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. RESTRICTED FLOW IN CROSSFEED PATH DURING A CROSSFEED OMS BURN COULD RESULT IN DAMAGE TO AND LOSS OF ENGINE DUE TO IMPROPER MIXTURE RATIO. PROP IN POD WITH AFFECTED ENGINE SUBSEQUENTLY STRANDED DUE TO LOSS OF CROSSFEED PATH RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS DURING ENTRY. FAILURE UNDETECTABLE UNTIL EFFECTS MANIFESTED.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007 6) FLIGHT RULES 6-9,B, 6-95,C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 223 ABORT: 2/1R

ITEM: VALVE-CROSSFEED
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT (PRIORITY FLIGHT INVOKED). LOSS OF ALL REDUNDANCY IS LOSS OF MISSION DUE TO LOSS OF OMS INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AC,BC 6) JSC 12770 7) JSC 18958 8) TM-ES86009-43 9) FLIGHT RULES 6-9,B, 6-95,B,C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 224

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: VALVE-CROSSFEED
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT (POSSIBLE LOSS OF RCS CROSSFEED CAPABILITY DURING OMS BURN TO AVOID BURNING RCS PROP THROUGH OMS).

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AC,BC 6) JSC 12770 7) JSC 18958 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 225 ABORT: 2/1R

ITEM: VALVE-CROSSFEED
FAILURE MODE: FAILS MIDTRAVEL, PARTIALLY OPEN/CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: CONTAMINATION, LOSS OF INPUT, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MISHANDLING

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY (DUE TO LOSS OF ADEQUATE FLOW PATH). WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AC,BC 6) JSC 12770 7) JSC 18958 8) TM-ES86009-43 9) FLIGHT RULES 6-9,B, 6-95,B,C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 226

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: VALVE-CROSSFEED
FAILURE MODE: INTERNAL LEAKAGE, FORWARD/REVERSE LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: PIECE-PART STRUCTURAL FAILURE, BALL SEAL FAILURES, RELIEF VALVE SEAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LOSS OF RCS CROSSFEED CAPABILITY DURING OMS BURN TO AVOID BURNING RCS PROP THROUGH OMS.

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AC,BC 6) JSC 12770 7) JSC 18958 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 227 ABORT: 1/1

ITEM: VALVE-CROSSFEED
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: HOUSING STRUCTURAL FAILURE, BELLOWS AND SEAL FAILURES, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. STRUCTURAL FAILURE OF HOUSING ALLOWS LOSS AND LEAKAGE OF PROP INTO POD RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AB,BB 6) JSC 12770 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 228 ABORT: 2/1R

ITEM: VALVE-CROSSFEED
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY. PROP FLOW RATE THROUGH CROSSFEED VALVES INSUFFICIENT TO SUPPORT OPS. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AB,BB 6) JSC 12770 7) JSC 12770 8) TM-ES86009-43 9) FLIGHT RULE 6-9,B, 6-95,B,C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 229 ABORT: 2/1R

ITEM: VALVE-CROSSFEED
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. WITH VALVE SWITCH IN GPC POSITION (TO OPEN VALVE AT START OF BURN), LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO POSSIBLE LOSS OF ENGINE DURING CROSSFEED OPS. INITIAL PROP FLOW RATE INSUFFICIENT TO SUPPORT BURN COULD LEAD TO DAMAGE TO AND LOSS OF ENGINE. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AB,BB 6) JSC 12770 7) JSC 12770 8) TM-ES86009-43 9) FLIGHT RULE 6-9,B, 6-95,B,C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 230 ABORT: 3/1R

ITEM: VALVE-CROSSFEED
FAILURE MODE: FAILS OUT OF TOLERANCE, RELIEF VALVE FAILS TO RELIEVE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A & B VLVS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC284-0430-0011,-0012

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF CROSSFEED LINES RESULTING IN LOSS OF LEAKAGE OF PROP INTO ORBITER, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #259-1,-2, 260,-1,-2 2) VS70-431099 3) MC284-0430 4)JSC 11174,11.3 5) VS70-943099,AB,BB 6) JSC 12770 7) JSC 12770 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/16/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 2/1R |
| MDAC ID: | 231 | ABORT: | 2/1R |

ITEM: COUPLING - HIGH-POINT BLEED
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) HIGH-POINT BLEED COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-2402,-2452

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #327, 328 2) VS70-431099 3) MC276-0018 4) VS70-943099,43AJ 5) JSC 11174,11.4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 232 ABORT: /NA

ITEM: COUPLING - HIGH-POINT BLEED
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) HIGH-POINT BLEED COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-2402,-2452

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #327, 328 2) VS70-431099 3) MC276-0018 4) VS70-943099,43AJ 5) JSC 11174,11.4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 233 ABORT: /NA

ITEM: COUPLING - HIGH-POINT BLEED
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) HIGH-POINT BLEED COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-2402,-2452

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #327, 328 2) VS70-431099 3) MC276-0018 4) VS70-943099,43AJ 5) JSC 11174,11.4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 234

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: COUPLING-CROSSFEED DRAIN
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED DRAIN COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-2401,-2451

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #381-384 2) VS70-431099 3) MC276-0018 4) VS70-943099,43AJ 5) JSC 11174,11.4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 235 ABORT: /NA

ITEM: COUPLING-CROSSFEED DRAIN
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED DRAIN COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-2401,-2451

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #381-384 2) VS70-431099 3) MC276-0018 4) VS70-943099,43AJ 5) JSC 11174,11.4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 236 ABORT: /NA

ITEM: COUPLING-CROSSFEED DRAIN
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) CROSSFEED DRAIN COUPLING
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-2401,-2451

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #381-384 2) VS70-431099 3) MC276-0018 4) VS70-943099,43AJ 5) JSC 11174,11.4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 237 ABORT: 3/3

ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) MMH AND NTO PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
ALL COUPLING LINES. NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 238 ABORT: 1/1

ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) MMH AND NTO PROPELLANT LINES AND MECHANICAL FITTINGS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
XFEED CONN TO ENG CONN; ENG LINES. FIRST FAILURE RESULTS IN LOSS OF ENGINE. WITH FIRST FAILURE, ONE FAILURE (RESTRICTION IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL RESULTS IN INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 239 ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. LOCATED BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION.

REFERENCES: 1) 73A000014, #266 2) VS70-431099 3) VS70-943099,43AD,BD 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 240

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATON

EFFECTS/RATIONALE:
FAILURE OF A BELLOWS TO PROVIDE ANGULAR COMPENSATION FOR PROP LINE MOVEMENTS COULD RESULT IN LINE RUPTURE, LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. LOCATED BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION.

REFERENCES: 1) 73A000014, #266 2) VS70-431099 3) VS70-943099,43AD,BD 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 241 ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FLOW RESTRICTION IN BELLOWS AT THIS LOCATION RESULTS IN POSSIBLE LOSS OF MISSION DUE TO LOSS OF ONE ENGINE. PROP IN AFFECTED POD STILL USABLE. WITH FIRST FAILURE, ONE FAILURE (RESTRICTION IN BELLOWS IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LOCATED BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION.

REFERENCES: 1) 73A000014, #266 2) VS70-431099 3) VS70-943099,43AD,BD 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86
SUBSYSTEM: OMS
MDAC ID: 242

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: GIMBAL BELLOWS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. LOCATED BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION.

REFERENCES: 1) 73A000014, #265 2) VS70-431099 3) VS70-943099,43AD,BD 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/16/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 1/1 |
| MDAC ID: | 243 | ABORT: | 1/1 |

ITEM: GIMBAL BELLOWS
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
FAILURE OF A BELLOWS TO PROVIDE ANGULAR DEFLECTION FOR PROP LINE MOVEMENTS COULD RESULT IN LINE RUPTURE, LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. LOCATED BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION.

REFERENCES: 1) 73A000014, #265 2) VS70-431099 3) VS70-943099,43AD,BD 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/16/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 2/1R |
| MDAC ID: | 244 | ABORT: | 1/1 |

ITEM: GIMBAL BELLOWS
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) GIMBAL BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P550015

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOCATED BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION. FLOW RESTRICTION IN BELLOWS AT THIS LOCATION RESULTS IN POSSIBLE LOSS OF MISSION DUE TO LOSS OF ENGINE. PROP IN AFFECTED POD STILL USABLE. WITH FIRST FAILURE, ONE FAILURE (RESTRICTION IN BELLOWS IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #265 2) VS70-431099 3) VS70-943099,43AD,BD 4) 73P550015

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 245 ABORT: 1/1

ITEM: ALIGNMENT BELLOWS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) ALIGNMENT BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550003

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. LOCATED ON FUEL LINE BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION.

REFERENCES: 1) 73A000014, #263 2) VS70-431099 3) VS70-943099,43AC,BC 4) 73P550003

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/16/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 1/1 |
| MDAC ID: | 246 | ABORT: | 1/1 |

ITEM: ALIGNMENT BELLOWS
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) ALIGNMENT BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 73P550003

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
FAILURE OF BELLOWS TO PROVIDE ANGULAR OR AXIAL COMPENSATION FOR PROP LINE MOVEMENTS COULD RESULT IN RUPTURE OF LINE, LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. LOCATED ON FUEL LINE BETWEEN CROSSFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION.

REFERENCES: 1) 73A000014, #263 2) VS70-431099 3) VS70-943099,43AC,BC 4) 73P550003

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 247 ABORT: 1/1

ITEM: ALIGNMENT BELLOWS
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) PROP STOR & DIST SUBSYSTEM
4) ALIGNMENT BELLOWS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 73P550003

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOCATED ON FUEL LINE BETWEEN XFEED LINE CONNECTION AND ENGINE INTERFACE CONNECTION. FLOW RESTRICTION IN BELLOWS AT THIS LOCATION RESULTS IN POSSIBLE LOSS OF MISSION DUE TO LOSS OF ENGINE. PROP IN AFFECTED POD STILL USABLE. WITH FIRST FAILURE, ONE FAILURE (RESTRICTION IN BELLOWS IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #263 2) VS70-431099 3) VS70-943099,43AC,BC 4) 73P550003

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 248 ABORT: 1/1

ITEM: ENGINE INLET FILTER AND ORIFICE
FAILURE MODE: STRUCTURAL FAILURE, CONTAMINATION PASSAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) ENGINE INLET FILTER AND ORIFICE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE INTRODUCES CONTAMINATION IN ENGINE LINES WHERE DAMAGE TO BI-PROP VALVES COULD RESULT IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (INLET FILTER IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) VS70-431099,SH3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 249 ABORT: 1/1

ITEM: ENGINE INLET FILTER AND ORIFICE
FAILURE MODE: RESTRICTED FLOW, CLOGGED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) ENGINE INLET FILTER AND ORIFICE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
WITH FIRST FAILURE AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (INLET FILTER IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) VS70-431099,SH3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 250 ABORT: 1/1

ITEM: BELLOWS-TVC GIMBAL
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) TVC GIMBAL BELLOWS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP AND RESULTING FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. LOCATED BETWEEN ENGINE INTERFACE CONNECTION AND BI-PROP VALVES.

REFERENCES: 1) MC621-0009

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 251 ABORT: 1/1

ITEM: BELLOWS-TVC GIMBAL
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) TVC GIMBAL BELLOWS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
FAILURE OF BELLOWS TO PROVIDE ANGULAR COMPENSATION FOR ENGINE AND PROP LINE MOVEMENTS COULD RESULT IN RUPTURE OF LINE, LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. LOCATED BETWEEN ENGINE INTERFACE CONNECTION AND BIPROP VALVES.

REFERENCES: 1) MC621-0009

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 252 ABORT: 1/1

ITEM: BELLOWS-TVC GIMBAL
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) TVC GIMBAL BELLOWS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
RESTRICTION AT THIS LOCATION RESULTS IN POSSIBLE LOSS OF MISSION DUE TO LOSS OF ONE ENGINE. PROP IN AFFECTED POD STILL USABLE. NEXT FAILURE (RESTRICTION IN BELLOWS IN OTHER POD) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LOCATED BETWEEN ENGINE INTFC CONN AND BIPROP VLVS.

REFERENCES: 1) MC621-0009

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/17/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 2/1R |
| MDAC ID: | 253 | ABORT: | 2/1R |

ITEM: COUPLING - HIGH-POINT BLEED TEST PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) HIGH-POINT BLEED TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #221, 222 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 254 ABORT: /NA

ITEM: COUPLING - HIGH-POINT BLEED TEST PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) HIGH-POINT BLEED TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #221, 222 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 255 ABORT: /NA

ITEM: COUPLING - HIGH-POINT BLEED TEST PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) HIGH-POINT BLEED TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3403,-3453

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #221, 222 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 256 ABORT: 1/1

ITEM: VALVE - BIPROPELLANT VALVE
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1181700

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH A FAILED CLOSED BIPROP VALVE RESULTING IN LOSS OF ONE ENGINE, ONE FAILURE (BIPROP VALVE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ONE ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #456 2) JSC 18958 3) MC621-0009 4) VS70-943099,43AD,BD 5) JSC 12770 6) JSC 11174,11.3 7) JSC 19950 8) 1181700 9) 1181710

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 257 ABORT: 2/1R

ITEM: VALVE - BIPROPELLANT VALVE
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1181700

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN SAVING OF AFFECTED ENGINE FOR DEORBIT. WITH FIRST FAILURE, ONE FAILURE (SERIES VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE. CLOSE TANK ISOL VALVES TO SHUTDOWN ENGINE. ATTEMPTING TO RESTART ENGINE WITH TANK ISOL VALVES RESULTS IN POSSIBLE DAMAGE TO AND LOSS OF ENGINE AND INABILITY TO USE/DEPLETE PROP IN AFFECTED POD. ANY USE OF PROP IN POD INITIATES FLOW THROUGH AFFECTED ENGINE. POSSIBLE HAZARD TO GROUND CREW. INABILITY TO STOP DUMP DURING RTLS OR TAL RESULTS IN POSSIBLE VIOLATIONS OF SINGLE ENGINE ROLL CONTROL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #456 2) JSC 18958 3) MC621-0009 4) VS70-943099,43AD,BD 5) JSC 12770 6) JSC 11174,11.3 7) JSC 19950 8) 1181700 9) 1181710 10) FLIGHT RULES 6-6, 6-26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 258 ABORT: 1/1

ITEM: VALVE - BIPROPELLANT VALVE
FAILURE MODE: FAILS MID TRAVEL, PARTIALLY OPEN/CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1181700

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (BIPROP VALVE IN OTHER POD) AWAY FROM LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. SUBSEQUENT LEAK OR FAILURE TO CLOSE OF SERIES VALVE RESULTS IN HAZARD TO GROUND CREW, USE OF TANK ISOL VALVES TO SHUTDOWN ENGINE, AND INABILITY TO USE/DEPLETE PROP IN AFFECTED POD TO AVOID FLOW THROUGH AFFECTED ENGINE.

REFERENCES: 1) 73A000014, #456 2) JSC 18958 3) MC621-0009 4) VS70-943099,43AD,BD 5) JSC 12770 6) JSC 11174,11.3 7) JSC 19950 8) 1181700 9) 1181710 10) FLIGHT RULE 6-3,H

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/17/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 2/1R |
| MDAC ID: | 259 | ABORT: | 2/1R |

ITEM: VALVE - BIPROPELLANT VALVE
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 1181700

CAUSES: SEAL FAILURES, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH LEAKAGE PAST ONE BALL VALVE, ONE FAILURE (LEAKAGE PAST SERIES VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE. MIGRATION INTO ENGINE AND FREEZING OF PROP MAY LEAD TO ENGINE DAMAGE OR EXPLOSION UPON START ATTEMPT RESULTING IN FIRE HAZARD AND POSSIBLE DAMAGE TO POD COMPONENTS AND VEHICLE STRUCTURE. LEAKAGE PAST BOTH VALVES ALSO PRESENTS HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #456 2) JSC 18958 3) MC621-0009 4) VS70-943099,43AD,BD 5) JSC 12770 6) JSC 11174,11.3 7) JSC 19950 8) 1181700 9) 1181710

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 260 ABORT: 1/1

ITEM: VALVE - BIPROPELLANT VALVE
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 1181700

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #456 2) JSC 18958 3) MC621-0009 4) VS70-943099,43AD,BD 5) JSC 12770 6) JSC 11174,11.3 7) JSC 19950 8) 1181700 9) 1181710

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 261 ABORT: 1/1

ITEM: VALVE - BIPROPELLANT VALVE
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1181700

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE MAY CAUSE LOW INITIAL FUEL AND OX FLOW RATES TO ENGINE RESULTING IN POSSIBLE DAMAGE TO AND LOSS OF ENGINE. WITH FIRST FAILURE, ONE FAILURE (BIPROP VALVE IN REDUNDANT POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014, #456 2) JSC 18958 3) MC621-0009 4) VS70-943099,43AD,BD 5) JSC 12770 6) JSC 11174,11.3 7) JSC 19950 8) 1181700 9) 1181710

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 262 ABORT: 1/1

ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF
FAILURE MODE: FAILS TO OPEN, FAILS TO OPEN AT SPECIFIED PSID

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP CAVITY PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN INABILITY TO RELIEVE OVERPRESSURIZATION, POSSIBLE DAMAGE TO BIPROP VALVES, AND LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FUNCTION IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. FIRST FAILURE COULD RESULT IN LEAKAGE OF PROP.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 263 ABORT: 3/3

ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF
FAILURE MODE: FAILS TO CLOSE, VALVE FAILS TO RESEAT

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP CAVITY PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT OTHER THAN LOSS OF REDUNDANCY. FAILURE OF A NONREDUNDANT ITEM REQUIRED FOR EFFECTS TO BE MANIFESTED. A FAILED OPEN RELIEF VALVE ALLOWS PROP TO BYPASS FIRST BIPROP VALVE AND, THEREFORE, RESULTS IN LOSS OF BIPROP VALVE SERIES REDUNDANCY. FAILURE TO CLOSE OR LEAKAGE OF SERIES BIPROP VALVE WOULD RESULT IN POSSIBLE LOSS OF LIFE/VEHICLE. (CRIT 2/1R FOR NOMINAL AND ABORTS)

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 264 ABORT: 3/3

ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP CAVITY PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: SEAL FAILURE, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT OTHER THAN LOSS OF REDUNDANCY. FAILURE OF A NON-REDUNDANT ITEM REQUIRED FOR EFFECTS TO BE MANIFESTED. A LEAKING RELIEF VALVE ALLOWS PROP TO BYPASS FIRST BIPROP VALVE AND, THEREFORE, RESULTS IN LOSS OF BIPROP VALVE SERIES REDUNDANCY. FAILURE TO CLOSE OR LEAKAGE OF SERIES BIPROP VALVE WOULD RESULT IN POSSIBLE LOSS OF LIFE/VEHICLE. (CRIT 2/1R FOR NOMINAL AND ABORTS)

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 265

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF
FAILURE MODE: STRUCTURAL FAILURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP CAVITY PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 266

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: VALVE - BIPROP CAVITY PRESSURE RELIEF
FAILURE MODE: FAILS OUT OF TOLERANCE, OPERATES AT LOWER THAN NORMAL PSID

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP CAVITY PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: MANUFACTURING DEFECT

EFFECTS/RATIONALE:
NO EFFECT IF VALVE OPENS AND CLOSES AT LOWER THAN SPECIFIED PSID.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 267 ABORT: 2/1R

ITEM: COUPLING - BIPROP VALVE DRAIN/PURGE TEST PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VALVE DRAIN/PURGE TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3402,-3452

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #231, 234 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 268 ABORT: /NA

ITEM: COUPLING - BIPROP VALVE DRAIN/PURGE TEST PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VALVE DRAIN/PURGE TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3402,-3452

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #231, 234 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 269 ABORT: /NA

ITEM: COUPLING - BIPROP VALVE DRAIN/PURGE TEST PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VALVE DRAIN/PURGE TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3402,-3452

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #231, 234 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 270 ABORT: 1/1

ITEM: OME ALIGNMENT BELLOWS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) OME ALIGNMENT BELLOWS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, WELD FAILURE, MANUFACTURING DEFECT, MISHANDLING, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSIVE HAZARD AND HAZARD TO GROUND CREW. LOCATED BETWEEN BI-PROP VALVES AND ENGINE INLET.

REFERENCES: 1) VS70-943099,43AD,BD 2) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 271 ABORT: /NA

ITEM: OME ALIGNMENT BELLOWS
FAILURE MODE: FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) OME ALIGNMENT BELLOWS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, MECHANICAL SHOCK, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.
LOCATED BETWEEN BI-PROP VALVES AND ENGINE INLET.

REFERENCES: 1) VS70-943099,43AD,BD 2) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 272

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: OME ALIGNMENT BELLOWS
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) OME ALIGNMENT BELLOWS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
WITH FIRST FAILURE AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (RESTRICTION IN ALIGNMENT BELLOWS IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. LOCATED BETWEEN BI-PROP VALVES AND ENGINE INLET.

REFERENCES: 1) VS70-943099,43AD,BD 2) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 273 ABORT: 2/1R

ITEM: COUPLING - BIPROP VALVE DRAIN PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VALVE DRAIN PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-0402,-0452

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #232,232A,233,233A 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) VS70-943099,43AD,BD 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 274

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING - BIPROP VALVE DRAIN PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VALVE DRAIN PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-0402,-0452

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #232,232A,233,233A 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) VS70-943099,43AD,BD 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 275 ABORT: /NA

ITEM: COUPLING - BIPROP VALVE DRAIN PORT
FAILURE MODE: FAILS TO OPEN, FAILS TO CLOSE, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BIPROP VALVE DRAIN PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-0402,-0452

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #232,232A,233,233A 2) VS70-431099 3) MC621-0059 4) MC276-0018 5) VS70-943099,43AD,BD 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 276

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) MMH AND NTO PROPELLANT LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0059

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
BIPROP PRESSURE RELIEF PATH LINE. FIRST FAILURE RESULTS IN INABILITY TO RELIEVE OVERPRESSURIZATION AND ALLOWS POSSIBLE DAMAGE TO BIPROP VALVES RESULTING IN POSSIBLE LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FUNCTION IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. FIRST FAILURE COULD RESULT IN LEAKAGE OF PROP.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 277 ABORT: 2/1R

ITEM: COUPLING-OMS ENGINE TRICKLE PURGE PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) OMS ENGINE TRICKLE PURGE PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 2/1R | TAL: | 2/1R |
| ONORBIT: | 2/1R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
WITH FAILURE OF POPPET SEAL, ONE FAILURE (CAP SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) 73A000014, #229, 230 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 278

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-OMS ENGINE TRICKLE PURGE PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) OMS ENGINE TRICKLE PURGE PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #229, 230 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 279 ABORT: /NA

ITEM: COUPLING-OMS ENGINE TRICKLE PURGE PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) OMS ENGINE TRICKLE PURGE PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0018-3401,-3451

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #229, 230 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0018, 5) MC621-0059 6) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/17/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 1/1 |
| MDAC ID: | 280 | ABORT: | 1/1 |

ITEM: PLATELET INJECTOR ASSEMBLY
FAILURE MODE: STRUCTURAL FAILURE, BURN THROUGH

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) PLATELET INJECTOR ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 1181220

CAUSES: PIECE-PART STRUCTURAL FAILURE, HIGH TEMPERATURE, COMBUSTION ANOMALIES, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE EXPLOSION, FIRE, AND DAMAGE TO SURROUNDING COMPONENTS AND VEHICLE STRUCTURE.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) 1181220 4) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/17/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 1/1 |
| MDAC ID: | 281 | ABORT: | 1/1 |

ITEM: PLATELET INJECTOR ASSEMBLY
FAILURE MODE: STRUCTURAL FAILURE, INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) PLATELET INJECTOR ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 1181220

CAUSES: DETONATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO MIXING OF HYPERGOLIC PROPELLANTS WITHIN INJECTOR RESULTING IN EXPLOSION, FIRE, AND POSSIBLE DAMAGE TO SURROUNDING COMPONENTS AND VEHICLE STRUCTURE.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) 1181220 4) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 282 ABORT: 1/1

ITEM: PLATELET INJECTOR ASSEMBLY
FAILURE MODE: RESTRICTED FLOW, CLOGGED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) PLATELET INJECTOR ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 1181220

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (RESTRICTION IN ASSEMBY IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) 1181220 4) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 283 ABORT: 1/1

ITEM: COMBUSTION CHAMBER
FAILURE MODE: STRUCTURAL FAILURE, BURN THROUGH

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) COMBUSTION CHAMBER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, HIGH TEMPERATURE, MATERIAL DEFECT, MANUFACTURING DEFECT, COMBUSTION ANOMALIES, INADEQUATE COOLING

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE EXPLOSION, FIRE, AND DAMAGE TO SURROUNDING COMPONENTS AND VEHICLE STRUCTURE.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) JSC 19950 4) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 284

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: COMBUSTION CHAMBER
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) COMBUSTION CHAMBER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE EXPLOSION, FIRE, AND DAMAGE TO SURROUNDING COMPONENTS AND VEHICLE STRUCTURE.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) JSC 19950 4) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 285 ABORT: 1/1

ITEM: NOZZLE EXTENSION
FAILURE MODE: STRUCTURAL FAILURE (BURN THROUGH, FRACTURE, DEFORMATION, FLANGE LEAKAGE)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) NOZZLE EXTENSION
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: 1181900

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, SEAL FAILURE, MANUFACTURING DEFECT, MISHANDLING, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO IMPINGEMENT OF EXHAUST GASES ONTO ORBITER SURFACES (ARCS HOUSING, ACCESS PANELS, VERTICAL STABILIZER) RESULTING IN POSSIBLE EXPLOSION, FIRE, AND/OR VEHICLE STRUCTURAL DAMAGE DURING ENGINE FIRING OR UPON ENGINE START.

REFERENCES: 1) 1181900 2) JSC 18958 3) 73A000014, #459 4) VS70-431099,43AE,BE

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 286

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: NOZZLE EXTENSION
FAILURE MODE: STRUCTURAL FAILURE, BUCKLING (DURING ASCENT)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) NOZZLE EXTENSION
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1181900

CAUSES: TVC FAILURE

EFFECTS/RATIONALE:
FAILURE DURING ASCENT DETECTABLE THROUGH TVC POSITION SENSORS. FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (OTHER NOZZLE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 1181900 2) JSC 18958 3) 73A000014, #459 4) VS70-431099,43AE,BE 5) FLIGHT RULE (TVC)

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 287 ABORT: 3/1R

ITEM: COUPLING-GN2 TANK FILL/VENT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 TANK FILL/VENT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC276-0017-0401

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANT AND LOSS OF BOTH ENGINES. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT.

REFERENCES: 1) 73A000014, #459 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0017 5) MC621-0009

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 288

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING-GN2 TANK FILL/VENT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 TANK FILL/VENT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0017-0401

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #459 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0017 5) MC621-0009

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 289 ABORT: /NA

ITEM: COUPLING-GN2 TANK FILL/VENT
FAILURE MODE: FAILS TO OPEN, FAILS TO CLOSE, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 TANK FILL/VENT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC276-0017-0401

CAUSES: FILTER BLOCKAGE, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014, #459 2) VS70-431099 3) VS70-943099,43AD,BD 4) MC276-0017 5) MC621-0009

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 290

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, WELD FAILURE, SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FILL PORT TO FILL VALVE. FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANTS AND LOSS OF START CAPABILITY FOR BOTH ENGINES. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 2/1R FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 291 ABORT: 3/3

ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
FILL PORT TO TANK. NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 292

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: VALVE-GN2 TANK FILL/VENT
FAILURE MODE: FAILS TO OPEN, FAILS TO CLOSE, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 TANK FILL/VENT VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 293 ABORT: 2/1R

ITEM: VALVE-GN2 TANK FILL/VENT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 TANK FILL/VENT VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, WELD FAILURE, MATERIAL DEFECT, HIGH PRESSURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH LOSS OF GN2 IN TANK, REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT. NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) FLIGHT RULE 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: OMS
MDAC ID: 294

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: VALVE-GN2 TANK FILL/VENT
FAILURE MODE: INTERNAL LEAKAGE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 TANK FILL/VENT VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, SEAL FAILURE, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF POPPET SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURE AND LOSS OF START CAPABILITY FOR BOTH ENGINES. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) FLIGHT RULE 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/17/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 1/1 |
| MDAC ID: | 295 | ABORT: | 1/1 |

ITEM: TANK-GN2 STORAGE
FAILURE MODE: RUPTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 STORAGE TANK
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, HIGH PRESSURE, HIGH TEMPERATURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POTENTIAL SHRAPNEL DAMAGE TO SURROUNDING COMPONENTS AND VEHICLE STRUCTURE.

REFERENCES: 1) MC621-0009 2) JSC 18958 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/21/86
SUBSYSTEM: OMS
MDAC ID: 296

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: TANK-GN2 STORAGE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 STORAGE TANK
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, HIGH PRESSURE, HIGH TEMPERATURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH LOSS OF GN2 TANK, REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT. NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) MC621-0009 2) JSC 18958 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950 7) FLIGHT RULE 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 1/07/87 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 3/1R |
| MDAC ID: | 297 | ABORT: | 2/1R |

ITEM: PNEUMATIC PACK ASSEMBLY HOUSING
FAILURE MODE: STRUCTURAL FAILURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC PACK ASSEMBLY HOUSING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: HOUSING STRUCTURAL FAILURE, MATERIAL DEFECT, SEAL FAILURES, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ONE ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT. ALL COMPONENTS ASSEMBLED ON HOUSING ATTACHED WITH AT LEAST ONE SEAL.

REFERENCES: 1) MC621-0009 2) JSC 18958 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950 7) FLIGHT RULE 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 298

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: PNEUMATIC PACK HOUSING ASSEMBLY
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC PACK HOUSING ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF ENGINE AFTER ACCUMULATOR DEPLETION DUE TO INABILITY TO REPRESSURIZE ACCUMULATOR. FAILURE NOT DETECTABLE UNTIL ENGINE IS LOST. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 299 ABORT: 2/1R

ITEM: VALVE-GN2 PRESSURE ISOLATION
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT, REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) JSC 19950 4) JSC 18958 5) JSC 12770 6) FLIGHT RULES 6-5,D, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 300

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: VALVE-GN2 PRESSURE ISOLATION
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT, REGULATOR LOCKS UP AND STOPS FLOW. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 AND LOSS OF START CAPABILITY FOR BOTH ENGINES. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 2/1R FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) JSC 19950 4) JSC 18958 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 301

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: VALVE-GN2 PRESSURE ISOLATION
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, SEAL FAILURE, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT, REGULATOR LOCKS UP AND STOPS FLOW. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 AND LOSS OF START CAPABILITY FOR BOTH ENGINES. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 2/1R FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) JSC 19950 4) JSC 18958 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 302

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: VALVE-GN2 PRESSURE ISOLATION
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, WELD FAILURE, MATERIAL DEFECT, HIGH PRESSURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH LOSS OF GN2 IN TANK, REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT. NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) JSC 19950 4) JSC 18958 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/18/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 2/1R |
| MDAC ID: | 303 | ABORT: | 2/1R |

ITEM: VALVE-GN2 PRESSURE ISOLATION
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
WITH RESTRICTED FLOW IN VALVE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO REPRESSURIZE ACCUMULATOR AND LOSS OF START CAPABILITY FOR BOTH ENGINES. FAILURE UNDETECTABLE UNTIL ENGINE LOST. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) JSC 19950 4) JSC 18958 5) JSC 12770 6) FLIGHT RULES 6-5,D, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 304 ABORT: 3/3

ITEM: VALVE-GN2 PRESSURE ISOLATION
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, MATERIAL DEFECT, IMPROPER INPUT

EFFECTS/RATIONALE:
NO EFFECT. ACCUMULATOR CAN BE REPRESSURIZED WHEN VALVE OPENS. WORST CASE OF FAILURE MODE IS "FAILS TO OPEN".

REFERENCES: 1) JSC 11174,11.3 2) VS70-943099,43AD,BD 3) JSC 19950 4) JSC 18958 5) JSC 12770 6) FLIGHT RULES 6-5,D, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 305 ABORT: 2/1R

ITEM: GN2 PRESSURE REGULATOR
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE REGULATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH FAILURE TO OPEN OF REGULATOR, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO REPRESSURIZE ACCUMULATORS AND LOSS OF START CAPABILITY FOR BOTH ENGINES. FAILURE UNDETECTABLE UNTIL ENGINE LOST. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5)JSC 19950 6) JSC 12770 7) FLIGHT RULES 6-5.B, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 306 ABORT: 2/1R

ITEM: GN2 PRESSURE REGULATOR
FAILURE MODE: FAILS TO REGULATE (FAILS TO CLOSE, FAILS TO LOCKUP, HIGH OUTPUT, INTERNAL LEAKAGE)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE REGULATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF GN2 PRESSURANT THROUGH RELIEF VALVE WOULD RESULT IN SAVING OF REMAINING ENGINE START (IN ACCUMULATOR) FOR DEORBIT BURN. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF DOWNSTREAM LINES OR COMPONENTS RESULTING IN LOSS OF ENGINES. WITH FAILURE OF REG DURING RTLS OR TAL, ONE FAILURE (RELIEF VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE RUPTURE OF DOWNSTREAM LINES OR COMPONENTS RESULTING IN LOSS OF ENGINE. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 19950 6) JSC 12770 7) FLIGHT RULE 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/18/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 3/1R |
| MDAC ID: | 307 | ABORT: | 2/1R |

ITEM: GN2 PRESSURE REGULATOR
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE REGULATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, WELD FAILURE, MATERIAL DEFECT, HIGH PRESSURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ONE ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) FLIGHT RULE 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 308 ABORT: 2/1R

ITEM: GN2 PRESSURE REGULATOR
FAILURE MODE: FAILS OUT OF TOLERANCE, REGULATES AT LOW PRESSURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE REGULATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF ENGINE RESTART CAPABILITY. WITH LOSS OF ONE ENGINE DUE TO FAILURE OF REGULATOR, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. SUBSEQUENT REGULATOR OUTPUT PRESSURE INSUFFICIENT TO SUPPORT ENGINE USAGE. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5)JSC 19950 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 309

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: GN2 PRESSURE REGULATOR
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE REGULATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
WITH RESTRICTED FLOW IN REGULATOR, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO REPRESSURIZE ACCUMULATORS AND LOSS OF START CAPABILITY FOR BOTH ENGINES. FAILURE UNDETECTABLE UNTIL ENGINE LOST. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 4) FLIGHT RULES 6-5,B, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 310

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, WELD FAILURE, SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
REG TEST PORT LINE. FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANTS AND LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 311 ABORT: 3/3

ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
REG TEST PORT LINE. NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 312 ABORT: 3/1R

ITEM: COUPLING, GN2 REGULATOR TEST PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 REGULATOR TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: ME276-0032-0009

CAUSES: SEAL FAILURES, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, PROCEDURAL ERROR, MISHANDLING, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANT AND LOSS OF BOTH ENGINGES. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT.

REFERENCES: 1) VS70-431099,SH3 2) ME276-0032 3) JSC 11174,11.3 4) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 313 ABORT: /NA

ITEM: COUPLING, GN2 REGULATOR TEST PORT
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 REGULATOR TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) VS70-431099,SH3 2) ME276-0032 3) JSC 11174,11.3 4) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 314

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING, GN2 REGULATOR TEST PORT
FAILURE MODE: FAILS TO CLOSE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 REGULATOR TEST PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) VS70-431099,SH3 2) ME276-0032 3) JSC 11174,11.3 4) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 315 ABORT: 2/1R

ITEM: VALVE-GN2 PRESSURE RELIEF
FAILURE MODE: FAILS TO OPEN, FAILS TO RELIEVE PRESSURE, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, BINDING

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. REGULATOR MUST FAIL HIGH FOR RELIEF VALVE FAILURE EFFECTS TO BE MANIFESTED. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. OVERPRESSURIZATION OF SUBSYSTEM COULD RESULT IN POSSIBLE RUPTURE OF LINES CAUSING LOSS OF GN2 PRESSURANT AND LOSS OF ENGINE START CAPABILITY. WITH FAILURE OF RELIEF VALVE DURING RTLS OR TAL, ONE FAILURE (REGULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE RUPTURE OF GN2 LINES, LOSS OF ENGINE START CAPABILITY, AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 316

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: VALVE-GN2 PRESSURE RELIEF
FAILURE MODE: FAILS TO CLOSE, FAILS TO RESEAT (AFTER REG FAILURE), FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, BINDING

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. REGULATOR MUST FAIL FOR EFFECTS OF FAILED OPEN RELIEF VALVE TO BE MANIFESTED. REMAINING START (IN ACCUMULATOR) SAVED FOR DEORBIT BURN. LOSS OF ALL REDUNANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF GN2 PRESSURANT IN TANKS AND ACCUMULATORS, AND LOSS OF START CAPABILITY FOR BOTH ENGINES. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT. CRIT 2/1R FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 19950 6) FLIGHT RULES 6-4,B, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/18/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 3/1R |
| MDAC ID: | 317 | ABORT: | 2/1R |

ITEM: VALVE-GN2 PRESSURE RELIEF
FAILURE MODE: INTERNAL/EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: SEAL FAILURES, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT BURN. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF GN2 PRESSURANT IN TANKS AND ACCUMULATORS AND LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 19950 6) FLIGHT RULES 6-4,B, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 318 ABORT: 2/1R

ITEM: VALVE-GN2 PRESSURE RELIEF
FAILURE MODE: FAILS OUT OF TOLERANCE, OPENS AT LOW PRESSURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE RELIEF VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: MANUFACTURING DEFECT, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT BURN. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF GN2 PRESSURANT IN TANKS AND ACCUMULATORS AND LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 19950 6) FLIGHT RULES 6-4,B, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 319

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: CHECK VALVE-GN2
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, BINDING

EFFECTS/RATIONALE:
WITH FAILURE TO OPEN OF CHECK VALVE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. INABILITY TO REPRESSURIZE ACCUMULATOR RESULTS IN LOSS OF ENGINE. FAILURE NOT DETECTABLE UNTIL ENGINE LOST. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099-43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950 7) FLIGHT RULES 6-5,C, 6-20

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87
SUBSYSTEM: OMS
MDAC ID: 320

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: CHECK VALVE-GN2
FAILURE MODE: FAILS TO CLOSE, VALVE FAILS TO RESEAT

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, BINDING

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF ACCUMULATOR FAIL-SAFE PROTECTION AGAINST LEAK UPSTREAM OF CHECK VALVE. WITH CHECK VALVE FAILED OPEN, A SUBSEQUENT SINGLE LEAK RESULTS IN LOSS OF AFFECTED ENGINE. FAILURE NOT DETECTABLE UNTIL SUBSEQUENT FAILURE OCCURS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE, (GN2 LEAK) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 1/07/87 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 3/1R |
| MDAC ID: | 321 | ABORT: | 2/1R |

ITEM: CHECK VALVE-GN2
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, SEAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF ACCUMULATOR FAIL-SAFE PROTECTION AGAINST LEAK UPSTREAM OF CHECK VALVE. WITH CHECK VALVE FAILED OPEN, A SUBSEQUENT SINGLE LEAK RESULTS IN LOSS OF AFFECTED ENGINE. FAILURE NOT DETECTABLE UNTIL SUBSEQUENT FAILURE OCCURS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE, (GN2 LEAK) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 322 ABORT: 1/1

ITEM: GN2 ACCUMULATOR
FAILURE MODE: RUPTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ACCUMULATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE, HIGH TEMPERATURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POTENTIAL SHRAPNEL DAMAGE TO SURROUNDING COMPONENTS, AND VEHICLE STRUCTURE, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 323 ABORT: 1/1

ITEM: GN2 ACCUMULATOR
FAILURE MODE: STRUCTURAL FAILURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ACCUMULATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE, HIGH TEMPERATURE, SEAL FAILURES

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (ACCUMULATOR IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) JSC 12770 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 324

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS
FAILURE MODE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, WELD FAILURE, SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
CHECK VALVE TO ENG CONTROL VALVES AND PURGE VALVE ASSY. FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAULIRE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL RESULTS IN LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP LEADING TO POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 325 ABORT: 1/1

ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
ACCUMULATOR TO ENG CONTROL VALVES. FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 326

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: VALVE-ENGINE CONTROL
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (CONTROL VALVE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABIITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 2) VS70-943099,43AD,BD 4) 1181700 5) JSC 11174,11.3 6) JSC 12770 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/18/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 2/1R |
| MDAC ID: | 327 | ABORT: | 2/1R |

ITEM: VALVE-ENGINE CONTROL
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN SAVING OF AFFECTED ENGINE FOR DEORBIT. WITH FAILURE TO CLOSE OF ONE ENGINE CONTROL VALVE, ONE FAILURE (FAILURE TO CLOSE OF REDUNDANT VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE. CLOSE TANK ISOL VALVES TO SHUTDOWN ENGINE. ATTEMPTING TO RESTART ENGINE WITH PROP TANK ISOLATION VALVES COULD RESULT IN DAMAGE TO AND LOSS OF ENGINE AND INABILITY TO USE/DEPLETE PORP IN AFFECTED POD. ANY USE OF PROP IN AFFECTED POD INITIATES FLOW THROUGH AFFECTED ENGINE. POSSIBLE HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 18958 2) MC621-0009 2) VS70-943099,43AD,BD 4) 1181700 5) JSC 11174,11.3 6) FLIGHT RULE 6-26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 328 ABORT: 1/1

ITEM: VALVE-ENGINE CONTROL
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: SEAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE (WITH VALVE IN EITHER OPENED OR CLOSED POSITION) RESULTS IN LOSS OF GN2 PRESSURANT THROUGH VENT PORT AND POSSIBLE INABILITY TO MAINTAIN ACTUATOR OPEN POSITION RESULTING IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF
ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 2) VS70-943099,43AD,BD 4) 1181700 5) JSC 11174,11.3 6) JSC 12770 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 329 ABORT: 1/1

ITEM: VALVE-ENGINE CONTROL
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GN2 PRESSURANT AND INABILITY TO MAINTAIN ACTUATOR OPEN POSITION RESULTING IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 2) VS70-943099,43AD,BD 4) 1181700 5) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 330 ABORT: 1/1

ITEM: VALVE-ENGINE CONTROL
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (CONTROL VALVE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 2) VS70-943099,43AD,BD 4) 1181700 5) JSC 11174,11.3 6) JSC 12770 7) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86
SUBSYSTEM: OMS
MDAC ID: 331

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: VALVE-ENGINE CONTROL
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, IMPROPER INPUT

EFFECTS/RATIONALE:
FIRST FAILURE MAY CAUSE LOW INITIAL FUEL AND OXID FLOW RATES TO ENGINE RESULTING IN POSSIBLE DAMAGE TO AND LOSS OF ENGINE. WITH FIRST FAILURE, ONE FAILURE (VALVE IN REDUNDANT POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181700 5) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 332

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: ORIFICE-ENGINE CONTROL VALVE INLET
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL VLV INLET ORIFICE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
WITH RESTRICTED FLOW INTO ONE ENGINE CONTROL VALVE AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (LOSS OF VALVE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 333 ABORT: 2/1R

ITEM: ORIFICE-ENGINE CONTROL VALVE VENT
FAILURE MODE: RESTRICTED FLOW, INABILITY TO VENT GN2 TO AMBIENT.

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL VLV VENT ORIFICE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN POSSIBLE INABILITY TO CLOSE BI-PROP VALVES. WITH FIRST FAILURE, ONE FAILURE (ENGINE CONTROL VALVE IN SAME POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO CLOSE ALL BI-PROP VALVES IN AFFECTED POD. CLOSE TANK ISOL VALVES TO SHUTDOWN ENGINES. ATTEMPTING TO RESTART ENGINES WITH PROP TANK ISOL VALVES COULD RESULT IN DAMAGE TO AND LOSS OF ENGINE AND INABILITY TO USE/DEPLETE PROP IN AFFECTED POD. ANY USE OF PROP IN AFFECTED POD INITIATES FLOW THROUGH ENGINE. POSSIBLE HAZARD TO GROUND CREW.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 334 ABORT: 2/1R

ITEM: CHECK VALVE-ENGINE CONTROL VALVE VENT
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL VLV VENT CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, BINDING

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN POSSIBLE INABILITY TO CLOSE BI-PROP VALVES. WITH FIRST FAILURE, ONE FAILURE (ENGINE CONTROL VALVE IN SAME POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO CLOSE ALL BI-PROP VALVES IN AFFECTED POD. CLOSE TANK ISOL VALVES TO SHUTDOWN ENGINES. ATTEMPTING TO RESTART ENGINES WITH PROP TANK ISOL VALVES COULD RESULT IN DAMAGE TO AND LOSS OF ENGINE AND INABILITY TO USE/DEPLETE PROP IN AFFECTED POD. ANY USE OF PROP IN AFFECTED POD INITIATES FLOW THROUGH ENGINE. POSSIBLE HAZARD TO GROUND CREW.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 335 ABORT: 1/1

ITEM: CHECK VALVE-ENGINE CONTROL VALVE VENT
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL VLV VENT CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MANUFACTURING DEFECT, BINDING

EFFECTS/RATIONALE:
FIRST FAILURE MAY ALLOW CONTAMINATION TO MIGRATE INTO VALVE AND ACTUATOR RESULTING IN POSSIBLE LOSS OF FUNCTION AND LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 336 ABORT: 1/1

ITEM: CHECK VALVE-ENGINE CONTROL VALVE VENT
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL VLV VENT CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, SEAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE MAY ALLOW CONTAMINATION TO MIGRATE INTO VALVE AND ACTUATOR RESULTING IN POSSIBLE LOSS OF FUNCTION AND LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 337 ABORT: 1/1

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: FAILS TO OPEN, FAILS TO OPERATE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1181710

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH FAILURE TO OPERATE OF ONE ACTUATOR AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (FAILURE TO OPERATE OF ACTUATOR IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 338

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: FAILS TO CLOSE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1181710

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN SAVING OF ENGINE FOR DEORBIT BURN. WITH FAILURE TO CLOSE OF ONE ACTUATOR, ONE FAILURE (FAILURE TO CLOSE OF REDUNDANT ACTUATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO CLOSE ALL BI-PROP VALVES IN AFFECTED POD. CLOSE TANK ISOL VALVES TO SHUT DOWN ENGINE. ATTEMPTING TO RESTART ENGINE WITH TANK ISOL VALVES COULD RESULT IN DAMAGE TO AND LOSS OF ENGINE AND INABILITY TO USE/DEPLETE PROP IN AFFECTED POD. ANY USE OF PROP IN AFFECTED POD INITIATES FLOW THROUGH ENGINE. POSSIBLE HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770 7) FLIGHT RULES 6-26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 339 ABORT: 1/1

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: FAILS MIDTRAVEL, PARTIALLY OPEN/CLOSED, PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 2/1R | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 2/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
WITH FAILURE TO OPERATE OF ONE ACTUATOR AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (FAILURE TO OPERATE OF ACTUATOR IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770 7) FLIGHT RULES 6-26, 6-3,H

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 340

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: INTERNAL LEAKAGE, PISTON SEAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST PISTON SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. LEAKAGE OF GN2 AROUND PISTON INTO ACTUATOR CAVITY WILL RESULT IN CLOSING OF BI-PROP VALVES WHEN GN2 PRESSURE IN CAVITY PLUS SPRING FORCE OVERCOME PISTON FACE GN2 PRESSURE. WITH FAILURE OF FIRST SEAL DURING RTLS OR TAL, ONE FAILURE (REDUNDANT SEAL) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770 7) FLIGHT RULE 6-26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 341 ABORT: 1/1

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: RUPTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, HIGH PRESSURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE SHRAPNEL DAMAGE TO SURROUNDING POD COMPONENTS AND VEHICLE STRUCTURE, AND FIRE/EXPLOSION HAZARD.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 342 ABORT: 3/1R

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: INTERNAL/EXTERNAL LEAKAGE (PROPELLANT)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: SEAL FAILURE, HIGH PRESSURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
LOSS OF ALL SEALS IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS AND LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. LEAK PATH IS BY BI-PROP BALL VALVE SEALS AND ACTUATOR SHAFT SEALS, INTO ACTUATOR CAVITY, AND OUT ACTUATOR VENT PORT. FAILURE OF ACTUATOR CAVITY SEPARATION SEALS COULD ALLOW MIXING OF HYPERGOLIC PROPELLANTS IN ACTUATOR AFTER FAILURE OF OTHER SEALS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 343 ABORT: 1/1

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: EXTERNAL LEAKAGE (GN2)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, WELD FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF AFFECTED ENGINE DUE TO INABILITY TO OPEN ONE SET OF BI-PROP VALVES. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770 7) FLIGHT RULE 6-26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 344 ABORT: 1/1

ITEM: PNEUMATIC ACTUATOR
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PNEUMATIC ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, IMPROPER INPUT, BINDING, CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE MAY CAUSE LOW INITIAL FUEL AND OXID FLOW RATES TO ENGINE RESULTING IN POSSIBLE DAMAGE TO AND LOSS OF ENGINE. WITH FIRST FAILURE, ONE FAILURE (ACTUATOR IN REDUNDANT POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) 1181710 5) JSC 11174,11.3 6) JSC 12770 7) FLIGHT RULE 6-26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87
SUBSYSTEM: OMS
MDAC ID: 345

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: COUPLING, VENT PORT ACTUATOR SHAFT SEAL
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) BIPROP VALVE ACTUATOR SHAFT SEAL VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032

CAUSES: SEAL FAILURE, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
NO EFFECT. ACTUATOR SHAFT SEALS EXPOSED TO AMBIENT.

REFERENCES: 1) 1181700 2) VS70-431099,SH.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87
SUBSYSTEM: OMS
MDAC ID: 346

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: /NA

ITEM: COUPLING, VENT PORT ACTUATOR SHAFT SEAL
FAILURE MODE: FAILS TO COUPLE, FAILS TO UNCOUPLE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) BIPROP VALVE ACTUATOR SHAFT SEAL VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 1181700 2) VS70-431099,SH.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 347 ABORT: /NA

ITEM: COUPLING, VENT PORT ACTUATOR SHAFT SEAL
FAILURE MODE: FAILS TO OPEN, FAILS TO CLOSE, RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) BIPROP VALVE ACTUATOR SHAFT SEAL VENT PORT COUPLING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | /NA |
| LIFTOFF: | /NA | TAL: | /NA |
| ONORBIT: | /NA | AOA: | /NA |
| DEORBIT: | /NA | ATO: | /NA |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: ME276-0032

CAUSES: PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR, MISHANDLING, CONTAMINATION

EFFECTS/RATIONALE:
NO EFFECT. POSSIBLE LAUNCH DELAY ONLY.

REFERENCES: 1) 1181700 2) VS70-431099,SH.3 3) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 348 ABORT: 1/1

ITEM: PINION GEAR AND DRIVE ASSEMBLY
FAILURE MODE: FAILS TO OPERATE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PINION GEAR AND DRIVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, INADEQUATE LUBRICATION, MATERIAL DEFECT, MANUFACTURING DEFECT, CONTAMINATION

EFFECTS/RATIONALE:
WORST CASE EFFECTS WITH FAILURE WHILE BI-PROPS CLOSED. WITH FAILURE TO OPERATE OF ONE ASSEMBLY AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (ASSEMBLY IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174,11.3 2) MC621-0009 3)JSC 12770 4) JSC 18958 5) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 349 ABORT: 1/1

ITEM: PINION GEAR AND DRIVE ASSEMBLY
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) PINION GEAR AND DRIVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN INABILITY TO CONTROL BI-PROP VALVE. WORST CASE EFFECTS WITH FAILURE WHILE BI-PROP VALVES CLOSED OR IN MID-TRAVEL. WITH FAILURE OF ONE GEAR/SHAFT ASSEMBLY AND LOSS OF AFFECTED ENGINE, ONE FAILURE (FAILURE OF GEAR/SHAFT ASSEMBLY IN EITHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174,11.3 2) MC621-0009 3)JSC 12770 4) JSC 18958 5) VS70-943099,43AD,BD

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 350

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: GN2 PRESSURE LINES AND MECHANICAL FITTINGS
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PRESSURE LINES AND MECHANICAL FITTINGS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
PURGE VALVE ASSY LEG. FIRST FAILURE IS NO EFFECT. AFFECTED ENGINE LOST FOR 10 MIN AFTER SHUTDOWN TO ALLOW FOR SUBLIMATION OF FROZEN FUEL IN LINES. OTHER ENGINE AVAILABLE IF BURN REQUIRED WITHIN 10 MIN PERIOD. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF BOTH ENGINES FOR 10 MINUTES. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) 73A000014 2) VS70-431099 3) AMS 5562 4) SAE 5622 5) MB0160-007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 351 ABORT: 3/2R

ITEM: VALVE-GN2 PURGE
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1186775

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. AFFECTED ENGINE LOST FOR 10 MINUTES AFTER SHUTDOWN TO ALLOW FOR SUBLIMATION OF FROZEN PROP IN ENGINE LINES. OTHER ENGINE AVAILABLE IF BURN REQUIRED WITHIN 10 MINUTES. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF BOTH ENGINES FOR 10 MINUTES AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009,P.71 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) VS70-431099,SH3 6)JSC 12770 7) JSC19950 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 352

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: VALVE-GN2 PURGE
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1186775

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANT, INABILITY TO MAINTAIN OPEN BI-PROP VALVES, AND LOSS OF BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE OF SERIES VALVE TO REMAIN CLOSED) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF GN2 PRESSURANT IN ONE POD, LOSS OF AFFECTED ENGINE, AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009,P.71 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) VS70-431099,SH3 6)JSC 12770 7) JSC19950 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 353

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: VALVE-GN2 PURGE
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: 1186775

CAUSES: SEAL FAILURES, MATERIAL DEFECT, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE OF FIRST VALVE SEAL IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANT, INABILITY TO MAINTAIN OPEN BI-PROP VALVES, AND SUBSEQUENT LOSS OF BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (SERIES VALVE SEAL) AWAY FROM LOSS OF LIFE/VEHICLE DUE TO LOSS OF GN2 PRESSURANT IN ONE POD, LOSS OF AFFECTED ENGINE, AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 18958 2) MC621-0009,P.71 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) VS70-431099,SH3 6)JSC 12770 7) JSC19950 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 354

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: VALVE-GN2 PURGE
FAILURE MODE: STRUCTURAL FAILURE, EXTERNAL LEAKAGE (DOWNSTREAM OF FIRST VALVE)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1186775

CAUSES: HOUSING STRUCTURAL FAILURE, SEAL FAILURES, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN POSSIBLE INADEQUATE PURGE. SUCCESS OF PURGE DETECTABLE THROUGH PC AND INJECTOR TEMP READINGS. AFFECTED ENGINE LOST FOR 10 MIN AFTER EACH BURN TO ALLOW FOR SUBLIMATION OF FROZEN FUEL IN ENGINE LINES. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF ENGINES FOR 10 MIN AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009,P.71 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) VS70-431099,SH3 6) JSC 12770 7) JSC19950 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 355 ABORT: 3/2R

ITEM: VALVE-GN2 PURGE
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1186775

CAUSES: FILTER BLOCKAGE, CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE IS LOSS OF PURGE. SUCCESS OF PURGE DETECTABLE THROUGH PC AND INJECTOR TEMP READINGS. AFFECTED ENGINE LOST FOR 10 MIN AFTER EACH USE TO ALLOW FOR SUBLIMATION OF FROZEN PROP IN ENGINE LINES. OTHER ENGINE AVAILABLE IF BURN REQUIRED WITHIN 10 MIN PERIOD. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF EACH ENGINE FOR 10 MIN AFTER EACH BURN. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009,P.71 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) VS70-431099,SH3 6)JSC 12770 7) JSC19950 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 356 ABORT: 3/2R

ITEM: VALVE-GN2 PURGE
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: 1186775

CAUSES: CONTAMINATION, IMPROPER INPUT, BINDING, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF PURGE CAPABILITY. SUCCESS OF PURGE DETECTABLE THROUGH PC AND INJECTOR TEMPERATURE READINGS. AFFECTED ENGINE LOST FOR 10 MINUTES AFTER SHUTDOWN TO ALLOW FOR SUBLIMATION OF FROZEN PROP IN ENGINE LINES. OTHER ENGINE AVAILABLE IF BURN REQUIRED WITHIN 10 MINUTES. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF ENGINES FOR 10 MINUTES AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009,P.71 3) VS70-943099,43AD,BD 4) JSC 11174,11.3 5) VS70-431099,SH3 6)JSC 12770 7) JSC19950 8) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 357 ABORT: 3/2R

ITEM: CHECK VALVE-GN2 PURGE
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, BINDING, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. AFFECTED ENGINE LOST FOR 10 MIN AFTER SHUTDOWN TO ALLOW FOR SUBLIMATION OF FROZEN FUEL IN ENGINE LINES. OTHER ENGINE AVAILABLE IF BURN REQUIRED WITHIN 10 MIN PERIOD. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF ENGINES FOR 10 MIN AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) VS70-431099,SH3 5) JSC 11174,11.3 6)JSC 12770 7) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 358 ABORT: 3/1R

ITEM: CHECK VALVE-GN2 PURGE
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PURGE CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, BINDING, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FAILURE UNDETECTABLE DURING FLIGHT. FIRST FAILURE IS NO EFFECT. FUEL WILL FLOW TO DOWNSTREAM PURGE VALVE DURING ENGINE BURN, BUT WILL BE FORCED OUT BY NOMINALLY PERFORMED PURGE. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE LOSS OF BOTH ENGINES. PASSAGE OF FUEL INTO PNEUMATIC SUBSYSTEM COULD RESULT IN LOSS OF SUBSYSTEM AND ENGINE.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) VS70-431099,SH3 5) JSC 11174,11.3 6)JSC 12770 7) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 359 ABORT: 3/1R

ITEM: CHECK VALVE-GN2 PURGE
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PURGE CHECK VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: SEAL FAILURE, MATERIAL DEFECT, CONTAMINATION, MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FAILURE UNDETECTABLE DURING FLIGHT. FIRST FAILURE IS NO EFFECT. FUEL WILL FLOW TO DOWNSTREAM PURGE VALVE DURING ENGINE BURN, BUT WILL BE FORCED OUT BY NOMINALLY PERFORMED PURGE. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE LOSS OF BOTH ENGINES. PASSAGE OF FUEL INTO PNEUMATIC SUBSYSTEM COULD RESULT IN LOSS OF SUBSYSTEM AND ENGINE.

REFERENCES: 1) JSC 18958 2) MC621-0009 3) VS70-943099,43AD,BD 4) VS70-431099,SH3 5) JSC 11174,11.3 6)JSC 12770 7) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 360

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: ORIFICE-GN2 PURGE
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PURGE ORIFICE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. AFFECTED ENGINE LOST FOR 10 MIN AFTER SHUTDOWN TO ALLOW FOR SUBLIMATION OF FROZEN FUEL IN ENGINE LINES. OTHER ENGINE AVAILABLE IF BURN REQUIRED WITHIN 10 MIN PERIOD. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF ENGINES FOR 10 MINUTES AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) MC621-0009 2) JSC 11174,11.3 3) VS70-431099,SH3 4) VS70-943099, 43AD, BD 5) TM-ESB6009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 361 ABORT: 3/2R

ITEM: GN2 PURGE VALVES TEST PORT
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 PURGE VALVES TEST PORT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: SEAL FAILURE, PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN POSSIBLE INADEQUATE PURGE. SUCCESS OF PURGE DETECTABLE THROUGH PC AND INJECTOR TEMP READINGS. AFFECTED ENGINE LOST FOR 10 MIN AFTER EACH BURN TO ALLOW FOR SUBLIMATION OF FROZEN FUEL IN ENGINE LINES. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF ENGINES FOR 10 MIN AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: 1) VS70-431099,SH3 2) VS70-943099,43AD,BD 3) JSC 11174,11.3 4) TM-ES86009-43

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/15/86
SUBSYSTEM: OMS
MDAC ID: 362

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: GIMBAL RING
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) GIMBAL RING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO EXCESSIVE MOVEMENT OF ENGINE RESULTING IN POSSIBLE RUPTURE OF CONNECTING PROP LINES ALLOWING LOSS AND LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) MC621-0009 2) MC621-0059 3) JSC 12770 4) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 363 ABORT: 2/1R

ITEM: BEARING-GIMBAL RING
FAILURE MODE: FAILS TO FUNCTION, PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) GIMBAL RING BEARING
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, INADEQUATE LUBRICATION, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE MAY RESULT IN LOSS OF ENGINE DUE TO LOSS OF ENGINE CONTROL. WITH FIRST FAILURE, ONE FAILURE (GIMBAL BEARING IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING OMS ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 1/1 FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) JSC 12770 3) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 364

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: GIMBAL RING MOUNTING PAD
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) GIMBAL RING MOUNTING PAD
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 1/1 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 1/1 | AOA: | 1/1 |
| DEORBIT: | 1/1 | ATO: | 1/1 |
| LANDING/SAFING: | 1/1 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE EXCESSIVE MOVEMENT OF ENGINE RESULTING IN POSSIBLE RUPTURE OF CONNECTING PROP LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) MC621-0009 2) MC621-0059, P.118 3) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 365 ABORT: 3/1R

ITEM: MOTOR-GIMBAL DRIVE
FAILURE MODE: LOSS OF OUTPUT, FAILS TO OPERATE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) GIMBAL DRIVE MOTOR
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: LOSS OF INPUT, ELECTRICAL FAILURE, PIECE-PART STRUCTURAL FAILURE, BINDING, MANUFACTURING DEFECT, MATERIAL DEFECT

EFFECTS/RATIONALE:
FAILURE OF FIRST CHANNEL MOTOR IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 366

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: MOTOR-GIMBAL DRIVE
FAILURE MODE: ERRATIC OPERATION (DELAYED OPERATION, SLOW RESPONSE, INADVERTENT/PREMATURE OPERATION, FAILS TO STOP)

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) GIMBAL DRIVE MOTOR
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: IMPROPER INPUT, ELECTRICAL FAILURE, PIECE-PART STRUCTURAL FAILURE, BINDING, MANUFACTURING DEFECT, MATERIAL DEFECT

EFFECTS/RATIONALE:
FAILURE OF FIRST CHANNEL MOTOR IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 367 ABORT: 2/1R

ITEM: ACME SCREW/NUT TUBE
FAILURE MODE: FAILS TO OPERATE, PHYSICAL BINDING/JAMMING BETWEEN ACME SCREW AND NUT TUBE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) ACME SCREW/NUT TUBE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN INABILITY TO ROTATE ACME SCREW OR NUT TUBE AND, THEREFORE, LOSS OF ACTUATOR. WITH FIRST FAILURE AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 1/1 FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 368

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: ACME SCREW/NUT TUBE
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) ACME SCREW/NUT TUBE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF TVC CONTROL OF ENGINE AND, THEREFORE, LOSS OF AFFECTED ENGINE. FIRST FAILURE MAY ALSO RESULT IN LOSS OF ENGINE RESTRAINT ALLOWING INADVERTENT FULL RANGE DEFLECTIONS OF ENGINE WITHIN GIMBAL RING CONSTRAINTS (DETECTABLE THROUGH ACTUATOR LVDTS). WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 1/1 FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 369

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: REDUCTION GEAR
FAILURE MODE: FAILS TO OPERATE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) REDUCTION GEAR
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, INADEQUATE LUBRICATION, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86
SUBSYSTEM: OMS
MDAC ID: 370

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: REDUCTION GEAR
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) REDUCTION GEAR
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 371 ABORT: 3/1R

ITEM: ANTIBACK DEVICE
FAILURE MODE: FAILS TO ROTATE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) ANTIBACK DEVICE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, INADEQUATE LUBRICATION, MATERICAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 372 ABORT: 3/1R

ITEM: ANTIBACK DEVICE
FAILURE MODE: FAILS TO STOP ROTATION OF UNUSED CHANNEL

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) ANTIBACK DEVICE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 373 ABORT: 2/1R

ITEM: ANTIBACK DEVICE
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) ANTIBACK DEVICE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, LOSS OF GEAR MESHING, STRIPPING, TOOTH FRACTURES, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
STRUCTURAL FAILURE OR FRACTURE OF ONE ANTIBACK DEVICE SUCH THAT DEVICE CAN NEITHER TRANSMIT MOTOR TORQUE FOR ACTIVE CHANNEL OPERATION OR STOP ROTATION OF UNUSED CHANNEL (LOSS OF GEAR MESHING, TOOTH FRACTURES, STRIPPING) RESULTS IN LOSS OF TVC CONTROL OF ENGINE AND SUBSEQUENT LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (SAME FAILURE IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 1/1 FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 374

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: BEARING-GIMBAL THRUST DRIVE
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) GIMBAL DRIVE THRUST BEARING
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE CAUSES POSSIBLE JAMMING OF CHANNEL; SWITCH TO SECONDARY CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 375 ABORT: 3/1R

ITEM: BEARING-GIMBAL THRUST DRIVE
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) GIMBAL DRIVE THRUST BEARING
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, INADEQUATE LUBRICATION, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT; SWITCH TO SECONDARY CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO ONS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 376 ABORT: 2/1R

ITEM: BEARING-SPHERICAL ROD END
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) SPHERICAL ROD END BEARING
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, INADEQUATE LUBRICATION, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN POSSIBLE INABILITY TO MOVE ENGINE AND SUBSEQUENT LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (BEARING IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 1/1 FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) MC621-0059, P.118 5) JSC 12770

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INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 377 ABORT: 2/1R

ITEM: BEARING-SPHERICAL ROD END
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) SPHERICAL ROD END BEARING
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN POSSIBLE INABILITY TO MOVE ENGINE AND SUBSEQUENT LOSS OF AFFECTED ENGINE. WITH FIRST FAILURE, ONE FAILURE (BEARING IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 1/1 FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) MC621-0059, P.118 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 378

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: MECHANICAL STOP-SNUBBER
FAILURE MODE: STRUCTURAL FAILURE, FAILS OUT OF TOLERANCE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) SNUBBER, MECHANICAL STOP
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE MAY RESULT IN LOSS OF ACTUATOR POSITION ADJUSTMENT OR POSSIBLE JAMMING OF ACTUATOR AND POSSIBLE LOSS OF TVC FOR AFFECTED ENGINE. WITH FIRST FAILURE AND RESULTING LOSS OF AFFECTED ENGINE, ONE FAILURE (SNUBBER IN OTHER POD) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 1/1 FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) MC621-0059, P.118 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 379 ABORT: 3/1R

ITEM: BEARING-NUT TUBE/OUTPUT SHAFT
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) NUT TUBE/OUTPUT SHAFT BEARING
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, INADEQUATE LUBRICATION, MATERIAL DEFECT, MANUFACTURING DEFECT, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF SECONDARY CHANNEL DUE TO INABILITY OF NUT TUBE TO ROTATE AROUND STATIONARY INNER OUTPUT SHAFT; SWITCH TO PRIMARY CHANNEL (NUT TUBE DOES NOT ROTATE). LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) MC621-0059, P.118 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 12/30/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 3/1R |
| MDAC ID: | 380 | ABORT: | 3/1R |

ITEM: BEARING-NUT TUBE/OUTPUT SHAFT
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) NUT TUBE/OUTPUT SHAFT BEARING
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF SECONDARY CHANNEL DUE TO INABILITY OF NUT TUBE TO ROTATE AROUND STATIONARY INNER OUTPUT SHAFT; SWITCH TO PRIMARY CHANNEL (NUT TUBE DOES NOT ROTATE). LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) MC621-0059, P.118 5) JSC 12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 1/1
MDAC ID: 381 ABORT: 1/1

ITEM: OUTPUT SHAFT
FAILURE MODE: STRUCTURAL FAILURE, FRACTURE, DISATTACHMENT OF ACTUATOR TO ENGINE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR
6) OUTPUT SHAFT
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 1/1 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 1/1 |
| DEORBIT: | 2/1R | ATO: | 1/1 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK, MATERIAL DEFECT, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING INSERTION BURN OR ABORT DUMP. STRUCTURAL FAILURE OF SHAFT MAY ALLOW MOVEMENT (>1.5 DEG) OF NOZZLE INTO MAX Q FLOWSTREAM WHERE BUCKLING COULD OCCUR. FAILURE MAY NOT CAUSE DEFLECTION OF ACTUATOR ARM AND, THEREFORE, MAY NOT BE DETECTED BY ACTUATOR LVDT. SUBSEQUENT FIRING OF ENGINE WITH UNDETECTED DAMAGE MAY CAUSE POD/VEHICLE DAMAGE RESULTING FROM THROAT/NOZZLE BURN THROUGH.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) MC621-0059, P.118 5) JSC 12770 6) FLIGHT RULE 6-57 7) JSC 18958

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87
SUBSYSTEM: OMS
MDAC ID: 382

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: GIMBAL ACTUATOR CONTROLLER
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) GIMBAL ACTUATOR CONTROLLER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: LOSS OF INPUT POWER, ELECTRICAL FAILURE, PIECE-PART FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FAILURE OF FIRST CHANNEL IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 383 ABORT: 3/1R

ITEM: GIMBAL ACTUATOR CONTROLLER
FAILURE MODE: ERRONEOUS/ERRATIC OUTPUT, FAILS TO STOP

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) HARDWARE COMPONENTS
2) ASSEMBLIES
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) GIMBAL ACTUATOR CONTROLLER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:
PART NUMBER: MC621-0009

CAUSES: ELECTRICAL FAILURE, PIECE-PART FAILURE, MANUFACTURING DEFECT

EFFECTS/RATIONALE:
FAILURE OF FIRST CHANNEL IS NO EFFECT; SWITCH TO REDUNDANT CHANNEL. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ORBITER CONTROL DURING ENGINE FIRING AND SUBSEQUENT LOSS OF BOTH ENGINES. RCS USAGE REQUIRED FOR VEHICLE CONTROL MAY BE EXCESSIVE. CRIT 2/1R FOR MANUAL TAL POST-MECO OMS DUMP DUE TO POSSIBLE LOSS OF VEHICLE CONTROL.

REFERENCES: 1) MC621-0009 2) 621-0009-2161 3) JSC 11174,9.13 4) JSC 12770 5) JSC 18958 6) JSC 19950

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 384

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN (NO OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 6, PCA 3
PART NUMBER: 56V76A131RPC37, 35

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL A VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 385 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 6, PCA 3
PART NUMBER: 56V76A131RPC37, 35

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN HE ISOL A VALVE FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 386 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC35; 55V76A132RPC42

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC VALVE HE ISOL A CLOSE CMD. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY THE EFFECTS WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 387 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC35; 55V76A132RPC42

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN HE ISOL A VALVE FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 388 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN (NO OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132RPC37, 56V76A133RPC30

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL B VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 389 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132RPC37, 56V76A133RPC30

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN HE ISOL VALVE B FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 390 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC32, 55V76A132RPC39

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC HE ISOL B VALVE CLOSE CMD. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY THE EFFECT WOULD BE THE SAME AS HE ISOL B VALVE FAILED CLOSE RESULTING IN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 391 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC32, 55V76A132RPC39

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN HE ISOL VALVE B FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 392 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN (LOSS OF OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131RPC36; 131RPC34

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN VAPOR ISOL VALVE 1. VALVE CAN STILL BE FULLY OPERATED BY CREW SWITCH A OR B. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVE FAILED CLOSE RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 393

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131RPC36; 131RPC34

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN VAPOR ISOL 1 VALVE FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY (IN ANY PHASE) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO MIXING OF PROP OR PROP VAPORS IN HELIUM LINES RESULTING IN POSSIBLE EXPLOSION AND RUPTURE OF LINES.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 394

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN (LOSS OF OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC34; 132RPC41

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO MANUALLY SELECT VAPOR ISOL VALVE 1 OPEN. VALVE IS STILL FULLY OPERATIONAL BY GPC CMD. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVE FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 395 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC34; 132RPC41

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN VAPOR ISOL 1 VALVE FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY (IN ANY PHASE) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO MIXING OF PROP OR PROP VAPORS IN HELIUM LINES RESULTING IN POSSIBLE EXPLOSION AND RUPTURE OF LINES.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 396 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER"
FAILURE MODE: FAILS OPEN (LOSS OF OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132RPC38; 133RPC31

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN VAPOR ISOL VALVE 1. VALVE CAN STILL BE FULLY OPERATED BY CREW SWITCH A OR B. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 397 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER"
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132RPC38; 133RPC31

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN VAPOR ISOL 2 VALVE FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY (IN ANY PHASE) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO MIXING OF PROP OR PROP VAPORS IN HELIUM LINES RESULTING IN POSSIBLE EXPLOSION AND RUPTURE OF LINES.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 398 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER"
FAILURE MODE: FAILS OPEN (LOSS OF OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC33; 132RPC40

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO MANUALLY OPEN VAPOR ISOL VALVE 2. VALVE CAN STILL BE FULLY OPERATED BY GPC CMDS. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 399 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER"
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) CONTROLLER, REMOTE POWER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133RPC33; 132RPC40

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN VAPOR ISOL 2 VALVE FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY (IN ANY PHASE) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO MIXING OF PROP OR PROP VAPORS IN HELIUM LINES RESULTING IN POSSIBLE EXPLOSION AND RUPTURE OF LINES.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 400

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR16; A1CR14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GNC HE ISOL A CLOSE CMD. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY THE EFFECTS WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 401 ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR16; A1CR14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GNC HE ISOL A CLOSE CMD. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY THE EFFECTS WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 402

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR15; A1CR13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL A VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 403 ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR15; A1CR13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL A VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 404

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR12, 56V76A133A3CR4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC HE ISOL B VALVE CLOSE CMD. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY THE EFFECTS WOULD BE THE SAME AS HE ISOL A & B VALVE FAILED CLOSE RESULTING IN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 405

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR12, 56V76A133A3CR4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC HE ISOL B VALVE CLOSE CMD. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY THE EFFECTS WOULD BE THE SAME AS HE ISOL A & B VALVE FAILED CLOSE RESULTING IN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 406

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR4; 56V76A133A3CR3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL B VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 407 ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR4; 56V76A133A3CR3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL B VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 408

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR13; 131A2CR11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN VAPOR ISOL VALVE 1. VALVE CAN STILL BE FULLY OPERATED BY CREW SWITCH A OR B. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVE FAILED CLOSE RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 409 ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR13; 131A2CR11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN VAPOR ISOL VALVE 1. VALVE CAN STILL BE FULLY OPERATED BY CREW SWITCH A OR B. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVE FAILED CLOSE RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

C-5

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 410

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3;AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1CR5; 55V76A132A1CR5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OPEN OX VAPOR ISOL VALVES 1 & 2 UTILIZING HE PRESS/VAPOR ISOL SWITCH B. VALVES STILL FULLY OPERATIONAL USING SWITCH A OR GPC CMDS. LOSS OF ALL REDUNDANCY RESULTS IN VAPOR ISOL VALVES 1 & 2 FAILED CLOSED RESULTING IN SUBSEQUENT INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 411

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3;AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1CR5; 55V76A132A1CR5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
POSSIBLE LOSS OF BOTH HE PRESS/VAPOR ISOL SWITCHES A & B TO OPEN VAPOR ISOL 1 & 2 VALVES. GPC CMD OF ALL VALVES STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY IS THE SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITAL MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 412

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN (LOSS OF OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR14; A2CR12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO MANUALLY SELECT VAPOR ISOL VALVE 1 OPEN. VALVE IS STILL FULLY OPERATIONAL BY GPC CMD. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVE FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 413

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A3CR14; A2CR12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO MANUALLY SELECT VAPOR ISOL VALVE 1 OPEN. VALVE IS STILL FULLY OPERATIONAL BY GPC CMD. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVE FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 414

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1CR6; 55V76A132A1CR6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OPEN OX VAPOR ISOL VALVES 1 & 2 UTILIZING HE PRESS/VAPOR ISOL SWITCH A. VALVES STILL FULLY OPERATIONAL USING SWITCH B OR GPC CMDS. LOSS OF ALL REDUNDANCY IS THE SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITAL MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 415 ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 1/2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1CR6; 55V76A132A1CR6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
POSSIBLE LOSS OF BOTH HE PRESS/VAPOR ISOL SWITCHES A & B TO OPEN VAPOR ISOL 1 & 2 VALVES. GPC CMD OF ALL VALVES STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY IS THE SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITAL MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 416

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN (LOSS OF OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR3; 133A2CR6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN VAPOR ISOL VALVE 2. VALVE CAN STILL BE FULLY OPERATED BY CREW SWITCH A OR B. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 417

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR3; 133A2CR6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN VAPOR ISOL VALVE 2. VALVE CAN STILL BE FULLY OPERATED BY CREW WITH SWITCH A OR B. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 418

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN (LOSS OF OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR11; 56V76A133A2CR14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO MANUALLY OPEN VAPOR ISOL VALVE 2. VALVE CAN STILL BE FULLY OPERATED BY GPC CMDS. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 419

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) VAPOR ISOL 2 VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132A2CR11; 56V76A133A2CR14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO MANUALLY OPEN VAPOR ISOL VALVE 2. VALVE CAN STILL BE FULLY OPERATED BY GPC CMDS. LOSS OF ALL REDUNDANCY SAME AS VAPOR ISOL 1 & 2 VALVES FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 420 ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J8-33 TYPE 1; J8-23 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL A VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 421

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J8-33 TYPE 1; J8-23 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN HE ISOL A VALVE FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 422 ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN (NO OUTPUT)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J8-23 TYPE 1; 123AR J8-23 (128) TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE GPC CAPABILITY TO OPEN HE ISOL B VALVE. VALVE CAN STILL BE FULLY OPERATED USING SWITCH. LOSS OF ALL REDUNDANCY WOULD BE THE SAME AS HE ISOL A & B FAILING CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 423 ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J8-23 TYPE 1; 123AR J8-23 (128) TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN HE ISOL VALVE B FAILED OPEN, NO EFFECT ON MISSION. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 424 ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS & VAPOR ISOL 1/2 VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S12; S14
PART NUMBER: 33V73A8F34; F3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC HE ISOL & VAPOR ISOL A VALVE CMDS. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY WORST CASE RESULTS IN HE ISOL A & B, AND VAPOR ISOL 1 & 2 VALVES FAILED OPEN. THE RESULT IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV E EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 425

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS & VAPOR ISOL 1/2 VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S13; S15
PART NUMBER: 33V73A8F21; F22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC HE ISOL & VAPOR ISOL B VALVE CMDS. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY WORST CASE RESULTS IN HE ISOL A & B, AND VAPOR ISOL 1 & 2 FAILED OPEN. THE RESULT IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 426

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J8-29; J8-43

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF VALVE TALKBACK RESULTS IN LT/RT HE VAPOR ISOL VALVE MISCOMPARE, V90X8274X/V90X8275X CREW ALERT (CLASS 3) AT TIG. THE CREW WILL RESPOND BY PLACING THE APPROPRIATE HE PRESS/VAPOR ISOL SWITCH TO THE OPEN POSITION, ALERT WILL CONTINUE AND THE BURN WILL CONTINUE AS PLANNED WITH ASSOCIATED VALVES SUSPECT.

REFERENCES: SEQ FSSR STS 81-0026, CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 427 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J8-29; J8-43

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK TO GPC STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 428 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J2-10; 54V76A121 J2-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE TALKBACK V43S4184E FOR HE PRESS/VAPOR ISOL SWITCH A IN CLOSE POSITION. SWITCH OPERATION CAN BE DETERMINED FROM HE ISOL VALVE TALKBACK V43X4152X.
FOR LOSS OF ALL REDUNDANCY SWITCH A & B OPERATION CAN BE DETERMINED FROM VALVE TALKBACKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 429 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J2-10; 54V76A121 J2-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK TO GPC STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 430 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS & VAPOR ISOL 1/2 VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1R28; 132A1R34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE TALKBACK V43S4186E FOR HE PRESS/VAPOR ISOL SWITCH A IN OPEN POSITION. SWITCH OPERATION CAN BE DETERMINED FROM HE ISOL AND VAPOR ISOL VALVE TALKBACKS V43X4152X & V43X4156X.
FOR LOSS OF ALL REDUNDANCY SWITCH A OR B OPERATION CAN BE DETERMINED FROM VALVE TALKBACKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 431

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL A VLVS & VAPOR ISOL 1/2 VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1R28; 132A1R34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK TO GPC STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 432

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122 J8-29; 56V76A123 J8-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF VALVE TALKBACK RESULTS IN LT/RT HE VAPOR ISOL VALVE MISCOMPARE, V90X8274X/V90X8275X CREW ALERT (CLASS 3) AT TIG. THE CREW WILL RESPOND BY PLACING THE APPROPRIATE HE PRESS/VAPOR ISOL SWITCH TO THE OPEN POSITION, ALERT WILL CONTINUE AND THE BURN WILL CONTINUE AS PLANNED WITH VALVES SUSPECT.

REFERENCES: VS70-943099 REV A EO B12; SEQ FSSR STS 81-0026, CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 433 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122 J8-29; 56V76A123 J8-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK TO GPC STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 434 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122 J2-2; 56V76A123 J2-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE TALKBACK V43S4185E FOR HE PRESS/VAPOR ISOL SWITCH A IN CLOSE POSITION. SWITCH OPERATION CAN BE DETERMINED FROM HE ISOL VALVE TALKBACK V43X4154X.
FOR LOSS OF ALL REDUNDANCY SWITCH A & B OPERATION CAN BE DETERMINED FROM VALVE TALKBACKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 435 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122 J2-2; 56V76A123 J2-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK TO GPC STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 436 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS & VAPOR ISOL 1/2 VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1R25; 132A1R33

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE TALKBACK V43S4187E FOR HE PRESS/VAPOR ISOL SWITCH B IN OPEN POSITION. SWITCH OPERATION CAN BE DETERMINED FROM HE ISOL AND VAPOR ISOL VALVE TALKBACKS V43X4154X & V43X4158X.
FOR LOSS OF ALL REDUNDANCY SWITCH A OR B OPERATION CAN BE DETERMINED FROM VALVE TALKBACKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 437 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE ISOL B VLVS & VAPOR ISOL 1/2 VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2
PART NUMBER: 56V76A133A1R25; 132A1R33

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK TO GPC STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 438 ABORT: 3/1R

ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE OPEN POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE PRESS ISOL A VLVS AND OX TK VAPOR ISOL A&B VLVS
5) SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08
PART NUMBER: 33V73A8-S12 ; S14

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE RESULTS IN THE HE ISOL A & VAPOR ISOL A&B VALVE STUCK IN OPEN POSITION. LOSS OF ALL REDUNDANCY RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 439

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE CLOSE POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE PRESS ISOL A VLVS AND OX TK VAPOR ISOL A&B VLVS
5) SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VALVE A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08
PART NUMBER: 33V73A8-S12 ; S14

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE RESULT IN TANK ISOL A VALVE STUCK IN CLOSED POSITION. RESULTING IN ONE FAILURE (REDUNDANT ISOL VALVE FAILS TO OPEN) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF PRESSURIZATION SOURCE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87
SUBSYSTEM: OMS
MDAC ID: 440

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE GPC POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE PRESS ISOL A VLVS AND OX TK VAPOR ISOL A&B VLVS
5) SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VALVE A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08
PART NUMBER: 33V73A8-S12 ; S14

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC HE ISOL A & VAPOR ISOL A&B VALVE CMDS. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY WORST CASE IS THE SAME AS THE HE ISOL A VLV FAILED CLOSED. RESULTING IN ONE FAILURE AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF PRESSURIZATION SOURCE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 441 ABORT: 2/1R

ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE CLOSE POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE PRESS ISOL B VLVS AND OX TK VAPOR ISOL A&B VLVS
5) SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VALVE B
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08
PART NUMBER: 33V73A8-S13, S15

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE RESULTS IN TANK ISOL B VALVE STUCK IN CLOSED POSITON. RESULTING IN ONE FAILURE (REDUNDANT ISOL VALVE FAILS TO OPEN) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF PRESSURIZATION SOURCE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 442 ABORT: 3/1R

ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE OPEN POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE PRESS ISOL B VLVS AND OX TK VAPOR ISOL A&B VLVS
5) SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VALVE B
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/1R | TAL: | 3/1R |
| ONORBIT: | 3/1R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08
PART NUMBER: 33V73A8-S13, S15

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN HE ISOL VALVE B AND BOTH VAPOR ISOL VALVES FAILED OPEN, NO MISSION EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GND CREW.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 443 ABORT: 2/1R

ITEM: SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE GPC POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) HE PRESS SUBSYSTEM
4) HE PRESS ISOL B VLVS AND OX TK VAPOR ISOL A&B VLVS
5) SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VALVE B
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08
PART NUMBER: 33V73A8-S13, S15

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC HE ISOL B & VAPOR ISOL A&B VALVE CMDS. VALVE CAN STILL BE FULLY OPERATED BY GPC. FOR LOSS OF ALL REDUNDANCY WORST CASE IS THE SAME AS THE HE ISOL B VLV FAILED CLOSED. RESULTING IN ONE FAILURE AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF PRESSURIZATION SOURCE AND SUBSEQUENT INABILITY TO USE/DEPLETE PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 11/13/86 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 3/2R |
| MDAC ID: | 444 | ABORT: | 3/3 |

ITEM: METER, OMS PRESSURE N2/HE TK
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) HE PRESS SUBSYSTEM
4) METER, OMS PRESSURE N2/HE TANK
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL F7A5 M2
PART NUMBER: 34V73A7A5-M2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
GAGE M2 PROVIDES A FALSE INDICATION OF LT/RT HE OR N2 PRESSURE (ALSO PAYLOAD KIT HE PRESSURE). THERE ARE STILL TWO OTHER REDUNDANT MEASUREMENT PATHS AVAILABLE FOR EACH LT/RT HE AND N2 PRESSURE THROUGH THE GPC.
IF ALL REDUNDANCY IS LOST (FAILS LOW INDICATING LOSS OF N2 OR HE) THE REAL STATUS OF THE OME N2 TANK WILL BE UNAVAILABLE OR ERRONEOUS INDICATION (LOSS OF N2) AND CAN RESULT IN FAILING 1 OMS HE OR 2 OMS GN2 TANKS LEAKING/FAILED; THEREFORE MISSION CAPABILITIES ARE LOST OR ATO COULD BE CALLED (SEE FLIGHT RULE 6-1).

REFERENCES: VS70-943099 REV A E0 B12; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 445

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SENSOR PRESSURE, HE TANK NO.1
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) HE PRESS SUBSYSTEM
4) SENSOR PRESSURE, HE TANK NO.1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: HELIUM TANK
PART NUMBER: 51V43PT401, 52V43PT501

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO UTILIZE PT401/PT501 FOR PRESSURE MEASUREMENT OF LT/RT OMS HE TK. A REDUNDANT LT/RT PRESSURE MEASUREMENT IS AVAILABLE UTLIZING PT402/PT502 MEASUREMENT V43P4122C/V43P5122C. IF ALL REDUNDANCY IS LOST (FAILS LOW INDICATING LOSS OF HE) THE REAL STATUS OF THE OMS HE TK WILL BE UNAVAILABLE OR ERRONEOUS INDICATION AND CAN RESULT IN FAILING LT/RT OMS HE TK (SEE FLIGHT RULE 6-1) DURING ASCENT REQUIRING AN ATO BE CALLED.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 446 ABORT: 3/3

ITEM: SENSOR PRESSURE, HE TANK NO.2
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) HE PRESS SUBSYSTEM
4) SENSOR PRESSURE, HE TANK NO.2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: HELIUM TANK
PART NUMBER: 51V43PT402, 52V43PT502

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO UTILIZE PT402/PT502 FOR PRESSURE MEASUREMENT OF LT/RT OMS HE TK. A REDUNDANT LT/RT PRESSURE MEASUREMENT IS AVAILABLE UTILIZING PT401/PT501 MEASUREMENT V43P4121C/V43P5121C. IF ALL REDUNDANCY IS LOST (FAILS LOW INDICATING LOSS OF HE) THE REAL STATUS OF THE OMS HE TK WILL BE UNAVAILABLE OR ERRONEOUS INDICATION AND CAN RESULT IN FAILING LT/RT OMS HE TK (SEE FLIGHT RULE 6-1) DURING ASCENT REQUIRING AN ATO BE CALLED.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 447 ABORT: 3/3

ITEM: SENSOR TEMPERATURE, OMS HE TANK UPPER
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) HE PRESS SUBSYSTEM
4) SENSOR TEMPERATURE, OMS HE TANK UPPER
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OMS, HE TANK
PART NUMBER: 51V43TT403, 52V43TT501

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALIDITY OF TEMP MEASUREMENT CAN BE DETERMINED FROM THE PRESSURE MEASUREMENTS V43P4122C & V43P4211C/V43P5122C & V43P5211C. IF ALL REDUNDANCY IS LOST (PRESSURE SENSORS FAIL LOW INDICATING LOSS OF HE) THE REAL STATUS OF THE OMS HE TK WILL BE UNAVAILABLE OR ERRONEOUS INDICATION AND CAN RESULT IN FAILING RT/LT OMS HE TK (REF FLIGHT RULE 6-1) DURING ASCENT REQUIRING AN ATO BE CALLED.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 448 ABORT: 3/3

ITEM: SENSOR TEMP, OX/HE TEST PORT FITTING TEMP 1 & TEMP 2
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) HE PRESS SUBSYSTEM
4) SENSOR TEMPERATURE, OX/HE TEST PORT FITTING TEMP 1 & TEMP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OX/HE TEST PORT
PART NUMBER: 51V43TT408, 51V43TT417, 52V43TT508, 52V43TT517

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, SENSOR FAILURE CAN BE DETERMINED BY MONITORING REDUNDANT MEASUREMENT AND OTHER KEEL WEB HTR SYSTEM TEMP MEASUREMENTS. LOSS OF ALL REDUNDANCY COULD LEAD TO INCORRECTLY FAILING HTR 51V43HR191/52V43HR192 AND SWITCHING TO REDUNDANT HTR GROUP, AND THEN FAILING HTR 51V43HR191/52V43HR192. THIS HEATER IS NOT MISSION CRITICAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: OMS
MDAC ID: 449

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH TOGGLE, OMS N2/HE PRESSURE DISPLAY SELECT
FAILURE MODE: FAILS TO SWITCH (POLES STUCK IN ONE OF THREE POSITIONS OR POLES FAIL TO MAKE CONTACT IN ANY POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) HE PRESS SUBSYSTEM
4) SWITCH TOGGLE, OMS N2/HE PRESSURE DISPLAY SELECT
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL F7A5 S1
PART NUMBER: 34V73A7A5-S1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO UTILIZE GAGE M2 FOR MONITORING LT/RT HE OR N2 PRESSURE (ALSO PAYLOAD KIT HE PRESSURE). THERE ARE STILL TWO PRESSURE MEASUREMENTS AVAILABLE FOR EACH LT/RT HE AND N2 THROUGH THE GPC.
THE LOSS OF ALL SIGNAL PATHS FOR HE AND N2 PRESSURE WOULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS SINCE ACTUAL STATUS OF EITHER SYSTEM WOULD BE UNAVAILABLE

REFERENCES: VS70-943099 REV A E0 B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 450

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114-ALL DIODES; 54V76A114-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE 6 OF WHICH A FAILURE WOULD RESULT IN LOSS OF ONE OF FOUR SIGNAL PATHS TO OPEN THE TK ISOL A VLV LOSS OF ALL REDUNDANCY CAN CAUSE LOSS OF VEHICLE/LIFE DURING ENTRY OR ABORTS DUE TO INABILITY TO USE/DEPLETE PROPELLANT (POSSIBLE STRUCTURAL & MASS PROPERTIES VIOLATION).

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 451 ABORT: 2/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114-ALL DIODES; 54V76A114-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE TWO OF WHICH A FAILURE WOULD RESULT IN ONE OF THE TWO TK ISOL A VLV'S BEING STUCK PARTIALLY OPEN/CLOSED WHEN
COMMANDED OPEN WHICH IS THE WORST CASE. WITH ONE VALVE FAILED MIDTRAVEL, ONE FAILURE (FAILURE TO OPEN OTHER VALVE) AWAY FROM POSSIBLE LOSS OF VEHICLE/LIFE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROPELLANT
(POSSIBLE STRUCTURAL & MASS PROPERTIES VIOLATION). FLOW RATE INSUFFICIENT TO SUPPORT BURN THIS MAKES PROPELLANT IN AFFECTED TANK UNUSABLE.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 452 ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116-ALL DIODES; 56V76A116-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE 6 OF WHICH A FAILURE WOULD RESULT IN LOSS OF ONE OF FOUR SIGNAL PATHS TO OPEN THE TK ISOL B VLV LOSS OF ALL REDUNDANCY CAN CAUSE LOSS OF VEHICLE/LIFE DURING ENTRY OR ABORTS DUE TO INABILITY TO USE/DEPLETE PROPELLANT (POSSIBLE STRUCTURAL & MASS PROPERTIES VIOLATION).

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 453

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116-ALL DIODES; 56V76A116-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE TWO OF WHICH A FAILURE WOULD RESULT IN ONE OF THE TWO TK ISOL B VLV'S BEING STUCK PARTIALLY OPEN/CLOSED WHEN
COMMANDED OPEN WHICH IS THE WORST CASE. WITH ONE VALVE FAILED MIDTRAVEL, ONE FAILURE (FAILURE TO OPEN OTHER VALVE) AWAY FROM POSSIBLE LOSS OF VEHICLE/LIFE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROPELLANT
(POSSIBLE STRUCTURAL & MASS PROPERTIES VIOLATION). FLOW RATE INSUFFICIENT TO SUPPORT BURN THIS MAKES PROPELLANT IN AFFECTED TANK UNUSABLE.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 454

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK XFEED A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114-ALL DIODES; 56V76A116-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE 6 OF WHICH A FAILURE WOULD RESULT IN LOSS OF ONE OF FOUR SIGNAL PATHS TO OPEN THE TK ISOL A VLV. LOSS OF ALL REDUNDANCY IS LOSS OF MISSION DUE TO LOSS OF OMS INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY. FIRST FAILURE DURING
RTLS OR TAL, ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS RESULTING IN POSSIBLE INABILITY TO COMPLETE TIME CRITICAL DUMP.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 455 ABORT: 2/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK XFEED A VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114-ALL DIODES; 56V76A116-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE TWO OF WHICH A FAILURE WOULD RESULT IN ONE OF THE TWO TK ISOL A VLV'S BEING STUCK PARTIALLY OPEN/CLOSE WHEN COMMANDED OPEN WHICH IS THE WORST CASE. LOSS OF ALL REDUNDANCY IS LOSS OF MISSION DUE TO LOSS OF OMS INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY. FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS RESULTING IN POSSIBLE INABILITY TO COMPLETE TIME CRITICAL DUMP.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 456 ABORT: 3/1R

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK XFEED B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115-ALL DIODES; 55V76A115-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE 6 OF WHICH A FAILURE WOULD RESULT IN LOSS OF ONE OF FOUR SIGNAL PATHS TO OPEN THE TK ISOL B VLV LOSS OF ALL REDUNDANCY IS LOSS OF MISSION DUE TO LOSS OF OMS INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY. FIRST FAILURE DURING
RTLS OR TAL, ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS RESULTING IN POSSIBLE INABILITY TO COMPLETE TIME CRITICAL DUMP.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 457 ABORT: 2/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK XFEED B VLVS
5) DIODE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115-ALL DIODES; 55V76A115-ALL DIODES

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
OUT OF THE 28 DIODES THERE ARE TWO OF WHICH A FAILURE WOULD RESULT IN ONE OF THE TWO TK ISOL B VLV'S BEING STUCK PARTIALLY OPEN/CLOSE WHEN COMMANDED OPEN WHICH IS THE WORST CASE. LOSS OF ALL REDUNDANCY IS LOSS OF MISSION DUE TO LOSS OF OMS INTERCONNECT/CROSSFEED CAPABILITY AND LOSS OF ENGINE REDUNDANCY. FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS RESULTING IN POSSIBLE INABILITY TO COMPLETE TIME CRITICAL DUMP.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 458 ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114AR19 TYPE I; 56V76A116AR25 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER THE OX VLV A, THE FU VLV A OR BOTH VLV'S FAILED TO OPEN WHEN COMMANDED AND HAVE FAILED PARTIALLY CLOSED.
WORST CASE IS VLV'S DECLARED FAILED CLOSED AND REDUNDANT VLV'S ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY FAILED CLOSED. THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 459

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114AR19 TYPE I; 56V76A116AR25 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER OX VLV A, FU VLV A OR BOTH VLV'S FAILED TO CLOSE WHEN COMMANDED AND HAVE FAILED PARTIALLY OPEN/PARTIALLY CLOSED.
GPC TALKBACK TO CREW IS STILL OPERATIONAL AND REDUNDANT VLV'S ARE AVAILABLE TO CLOSE XFEED LINE.
LOSS OF ALL TALKBACK INDICATION OF XFEED VLV'S CLOSING, WORST CASE, WOULD RESULT IN FAILING THE CROSSFEED VALVES OPEN. THIS IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/CROSSFEED CAPABILITY TO RCS (TO AVOID DIRECT CONNECTION OF TK'S).

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 460

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114AR18 TYPE I; 56V76A116AR26 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER OX VLV A, FU VLV A OR BOTH VLV'S FAILED TO CLOSE WHEN COMMANDED AND HAVE FAILED PARTIALLY OPEN/PARTIALLY CLOSED.
GPC TALKBACK TO CREW IS STILL OPERATIONAL AND REDUNDANT VLV'S ARE AVAILABLE TO CLOSE XFEED LINE.
LOSS OF ALL TALKBACK INDICATION OF XFEED VLV'S CLOSING, WORST CASE, WOULD RESULT IN FAILING THE CROSSFEED VALVES OPEN. THIS IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/CROSSFEED CAPABILITY TO RCS (TO AVOID DIRECT CONNECTION OF TK'S).

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 461

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114AR18 TYPE I; 56V76A116AR26 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER THE OX VLV, THE FU VLV OR BOTH VLV'S FAILED TO OPEN WHEN COMMANDED AND HAVE FAILED PARTIALLY CLOSED.
WORST CASE IS VLV'S DECLARED FAILED CLOSED AND REDUNDANT VLV'S ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 462

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115AR18 TYPE 1; AR20 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER OX VLV A, FU VLV A OR BOTH VLV'S FAILED TO CLOSE WHEN COMMANDED AND HAVE FAILED PARTIALLY OPEN/PARTIALLY CLOSED.
GPC TALKBACK TO CREW IS STILL OPERATIONAL AND REDUNDANT VLV'S ARE AVAILABLE TO CLOSE XFEED LINE.
LOSS OF ALL TALKBACK INDICATION OF XFEED VLV'S CLOSING, WORST CASE, WOULD RESULT IN FAILING THE CROSSFEED VALVE OPEN RESULTING IN LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/CROSSFEED CAPABILITY TO RCS (TO AVOID DIRECT CONNECTION OF TK'S).

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 463

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115AR18 TYPE 1; AR20 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER THE OX VLV, THE FU VLV OR BOTH VLV'S FAILED TO OPEN WHEN COMMANDED AND HAVE FAILED PARTIALLY CLOSED.
WORST CASE IS VLV'S DECLARED FAILED CLOSED AND REDUNDANT VLV'S ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 464

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115AR17 TYPE 1; AR19 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER THE OX VLV, THE FU VLV OR BOTH VLV'S FAILED TO OPEN WHEN COMMANDED AND HAVE FAILED PARTIALLY CLOSED.
WORST CASE IS VLV'S DECLARED FAILED CLOSED AND REDUNDANT VLV'S ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 465

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115AR17 TYPE 1; AR19 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSELY INDICATES EITHER OX VLV A, FU VLV A OR BOTH VLV'S FAILED TO CLOSE WHEN COMMANDED AND HAVE FAILED PARTIALLY OPEN/PARTIALLY CLOSED.
GPC TALKBACK TO CREW IS STILL OPERATIONAL AND REDUNDANT VLV'S ARE AVAILABLE TO CLOSE XFEED LINE.
LOSS OF ALL TALKBACK INDICATION OF XFEED VLV'S CLOSING, WORST CASE, WOULD RESULT IN FAILING THE CROSSFEED VALVE OPEN RESULTING IN LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/CROSSFEED CAPABILITY TO RCS (TO AVOID DIRECT CONNECTION OF TK'S).

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 466

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114AR17 TYPE 1; AR21 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 467

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114AR17 TYPE 1; AR21 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD SHOW A BARBER POLE WHEN THE OX AND FU TK ISOL A VALVES ARE COMMANDED CLOSED FALSELY INDICATING THE FU OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE.
LOSS OF ALL REDUNDANCY COULD FALSELY RESULT IN FAILING THE A OR B VALVES OPEN. THE ONLY EFFECT A FAILED OPEN VALVE HAS IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO THE AFFECTED POD.
XFEED STILL AVAILABLE, NO MISSION IMPACT.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 468

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114AR16 TYPE 1; AR20 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD SHOW A BARBER POLE WHEN THE OX AND FU TK ISOL A VALVES ARE COMMANDED CLOSED FALSELY INDICATING THE FU OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE.
LOSS OF ALL REDUNDANCY COULD FALSELY RESULT IN FAILING THE A OR B VALVES OPEN. THE ONLY EFFECT A FAILED OPEN VALVE HAS IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO THE AFFECTED POD.
XFEED STILL AVAILABLE, NO MISSION IMPACT.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 469 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114AR16 TYPE 1; AR20 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 470 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116AR23 TYPE 1; AR21 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL B POSITION INDICATION DS6/DS8 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "B" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSE RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 471 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116AR23 TYPE 1; AR21 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL B POSITION INDICATION DS6/DS8 WOULD SHOW A BARBERPOLE WHEN THE OX AN FU TK ISOL B VALVES ARE COMMANDED CLOSED FALSELY INDICATING THE FU OR OX B VALVES ARE STUCK PARTIALLY OPEN/CLOSE.
LOSS OF ALL REDUNDANCY COULD FALSELY RESULT IN FAILING THE A OR B VALVES OPEN. THE ONLY EFFECT A FAILED OPEN VALVE HAS IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO THE AFFECTED POD. XFEED STILL AVAILABLE, NO MISSION IMPACT.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 472 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116AR24 TYPE 1; AR22 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL B POSITION INDICATION DS6/DS8 WOULD SHOW A BARBERPOLE WHEN THE OX OR FU TK ISOL B VALVES ARE COMMANDED CLOSED FALSELY INDICATING THE FU OR OX B VALVES ARE STUCK PARTIALLY OPEN/CLOSE.
LOSS OF ALL REDUNDANCY COULD FALSELY RESULT IN FAILING THE A OR B VALVES OPEN. THE ONLY EFFECT A FAILED OPEN VALVE HAS IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO THE AFFECTED POD. XFEED STILL AVAILABLE, NO MISSION IMPACT.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 473 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) DRIVER, HYBRID
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116AR24 TYPE 1; AR22 TYPE 1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL B POSITION INDICATION DS6/DS8 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "B" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 474 ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S26; S28
PART NUMBER: 33V73AA8F17; F18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS (OR LOSE ONLY PATH) TO OVERRIDE GPC AND OPEN (CLOSE) LT/RT OX TK XFEED VLV A. LOSS OF ALL REDUNDANCY HAS THE SAME EFFECT AS TK XFEED VLV'S LT/RT FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 475

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S26; S28
PART NUMBER: 33V73AA8F8; F9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS (OR LOSE ONLY PATH) TO OVERRIDE GPC AND OPEN (CLOSE) LT/RT OX TK XFEED VLV A. LOSS OF ALL REDUNDANCY HAS THE SAME EFFECT AS TK XFEED VLV'S LT/RT FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 476

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S27; S29
PART NUMBER: 33V73A8F25; F26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS (OR LOSE ONLY PATH) TO OVERRIDE GPC AND OPEN (CLOSE) LT/RT OX TK XFEED VLV B. LOSS OF ALL REDUNDANCY HAS THE SAME EFFECT AS TK XFEED VLV'S LT/RT FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 477

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S27; S29
PART NUMBER: 33V73A8F30; F31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS (OR LOSE ONLY PATH) TO OVERRIDE GPC AND OPEN (CLOSE) LT/RT OX TK XFEED VLV B. LOSS OF ALL REDUNDANCY HAS THE SAME EFFECT AS TK XFEED VLV'S LT/RT FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 478

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S19; S21
PART NUMBER: 33V73A8F5; F6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC AND CMD LT/RT OMS OX AND FU ISOL A VALVES CLOSED USING CREW SWITCH. VALVES CAN STILL BE FULLY OPERATED BY GPC AND OPENED WITH CREW SWITCH.
LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH TK ISOL VALVES A AND B FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE OMS PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 479

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S19; S21
PART NUMBER: 33V73A8F14; F15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC AND CMD LT/RT OMS OX AND FU ISOL A VALVES CLOSED USING CREW SWITCH. VALVES CAN STILL BE FULLY OPERATED BY GPC AND OPENED WITH CREW SWITCH.
LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH TK ISOL VALVES A AND B FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE OMS PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 480

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S20; S22
PART NUMBER: 33V73A8F29; F40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC AND CMD LT/RT OMS OX AND FU ISOL B VALVES CLOSED USING CREW SWITCH. VALVES CAN STILL BE FULLY OPERATED BY GPC AND OPENED WITH CREW SWITCH.
LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH THE TK ISOL VALVES A AND B FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE OMS PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 481 ABORT: 3/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) FUSE, 1A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S20; S22
PART NUMBER: 33V73A8F35; F24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO OVERRIDE GPC AND CMD LT/RT OMS OX AND FU ISOL B VALVES CLOSED USING CREW SWITCH. VALVES CAN STILL BE FULLY OPERATED BY GPC AND OPENED WITH CREW SWITCH.
LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH THE TK ISOL VALVES A AND B FAILED CLOSED RESULTING IN AN INABILITY TO USE/DEPLETE OMS PROPELLANT. TRAPPED PROPELLANT IS POSSIBLE VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 482 ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K49, K50; 56V76A116K74, K76

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE FU TK XFEED "A" VALVE AND LOSS OF LT & RT RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY (TO AVOID DIRECT CONNECTION OF OMS AND RCS TANKS). WITH ONE CROSSFEED VALVE FAILED OPEN, A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 483

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K49, K50; 56V76A116K74, 76

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, REDUNDANT RELAY WILL MAINTAIN PROPER CONTROL TO CLOSE FU TK XFEED VLV A.
LOSS OF ALL REDUNDANCY, WORST CASE, WOULD BE A MOMENTARY CLOSURE OF XFEED VLV'S A & B (LT/RT) DURING A BURN.
PROPER XFEED OPERATION CAN BE RESTORED BY PLACING THE OMS XFEED A OR B (LT/RT) SWITCH IN THE OPEN POSITION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 484

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K51, K52; 56V76A116K75, 77

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE ONE OF TWO ELECTRICAL PATHS TO OPEN FU TK XFEED VLV A LT/RT. LOSS OF ALL REDUNDANCY HAS THE SAME RESULT AS TK XFEED VALVES LT/RT FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 485

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K51, K52; 56V76A116K75, 77

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN FAILED OPEN FU TK XFEED "A" VAVLES AND LOSS OF ANY RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY TO AVOID DIRECT CONNECTION OF OMS AND RCS TANKS.
A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE, WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 486 ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K41, K42; K49, K50

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE FU TK XFEED "B" VALVE AND LOSS OF LT & RT RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY (TO AVOID DIRECT CONNECTION OF ALL OMS AND RCS TANKS). WITH ONE OMS CROSSFEED VALVE FAILED OPEN, A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 487

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K41, K42; K49, K50

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, REDUNDANT RELAY WILL MAINTAIN PROPER CONTROL OF CLOSING FU TK XFEED VLV B.
LOSS OF ALL REDUNDANCY WORST CASE WOULD BE A MOMENTARY CLOSURE OF XFEED VLV'S A & B (LT/RT) DURING A BURN.
PROPER XFEED OPERATION CAN BE RESTORED BY PLACING THE OMS XFEED A OR B (LT/RT) SWITCH IN THE OPEN POSITION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 488

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K40, K43; K48, K51

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE ONE OF TWO ELECTRICAL PATHS TO OPEN LT/RT FU TK XFEED VLV B. LOSS OF ALL REDUNDANCY HAS THE SAME RESULT AS LT/RT TK XFEED VALVES FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 489 ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K40, K43; K48, K51

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN FAILED OPEN FU TK XFEED "B" VALVES AND LOSS OF ANY RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY TO AVOID DIRECT CONNECTION OF OMS AND RCS TANKS.
A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE, WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 490 ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K41, 42; K57, 58

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT FU TK ISOL A VALVE. LOSS OF ALL REDUNDANCY RESULTS IN LT/RT FU TK ISOL A AND B VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS A UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 491 ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K41, 42; K57, 58

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED CLOSED RELAY K41 OR 42/K57 OR 58 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN CLOSURE OF FUEL TANK ISOL VALVE A & B (LT/RT).
THIS FAILURE CAN BE CORRECTED BY PLACEMENT OF LT/RT OMS TK ISOL SWITCH A & B INTO THE OPEN POSITION. DURING TIME CRITICAL ABORT DUMPS AN OME SHUT DOWN COULD OCCUR BEFORE PROPER ACTION IS TAKEN AND RESULT IN LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 492 ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K43, 44; K59, 60

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED OPEN RELAY K43 OR 44/K59 OR 60 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN AN INABILITY TO OPEN FU TK ISOL VALVE'S A & B (LT/RT).
THIS PRECLUDES USE/DEPLETION OF PROP RESULTING IN VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 493

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K43, 44; K59, 60

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT FU TK ISOL A VALVE. LOSS OF ALL REDUNDANCY RESULTS IN LT/RT FU TK ISOL A AND B VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 494

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K68, 69; K60, 61

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT FU TK ISOL B VALVE. LOSS OF ALL REDUNDANCY RESULTS IN LT/RT FU TK ISOL A & B (LT/RT) VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 495 ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K68, 69; K60, 61

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED CLOSED RELAY K41 OR 42/K57 OR 58 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN A CLOSURE OF FUEL TANK ISOL VALVE A & B (LT/RT).
THIS FAILURE CAN BE CORRECTED BY PLACEMENT OF LT/RT OMS TK ISOL SWITCH A & B INTO THE OPEN POSITION. DURING TIME CRITICAL ABORT DUMPS AN OME SHUT DOWN COULD OCCUR BEFORE PROPER ACTION IS TAKEN AND RESULT IN LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 496 ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K66, 67; K58, 59

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED OPEN RELAY K66 OR 67/K58 OR 59 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN AN INABILITY TO OPEN FU TK ISOL VALVE'S A & B (LT/RT).
THIS PRECLUDES USE/DEPLETION OF OMS PROP RESULTING IN VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 497

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K66, 67; K58, 59

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT FU TK ISOL B VALVE. LOSS OF ALL REDUNDANCY RESULTS IN LT/RT FU TK ISOL A & B VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14; MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 498 ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K53, K54; 56V76A116K80, K81

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE OX TK XFEED "A" VALVE AND LOSS OF LT & RT RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY (TO AVOID DIRECT CONNECTION OF OMS AND RCS TANKS). WITH ONE OMS CROSSFEED VALVE FAILED OPEN, A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 499

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K53, K54; 56V76A116K80, K81

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, REDUNDANT RELAY WILL MAINTAIN PROPER CONTROL TO CLOSE OX TK XFEED VLV A.
LOSS OF ALL REDUNDANCY, WORST CASE, WOULD BE A MOMENTARY CLOSURE OF XFEED VLV'S A & B (LT/RT) DURING A BURN.
PROPER XFEED OPERATION CAN BE RESTORED BY PLACING THE OMS XFEED A OR B (LT/RT) SWITCH IN THE OPEN POSITION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 500

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K55, K56; 56V76A116K78, K79

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE ONE OF TWO ELECTRICAL PATHS TO OPEN LT/RT OX TK XFEED VLV A. LOSS OF ALL REDUNDANCY HAS THE SAME RESULT AS LT/RT TK XFEED VALVES FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 501

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 54V76A114K55, K56; 56V76A116K78, K79

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN FAILED OPEN OX TK XFEED "A" VALVES AND LOSS OF ANY RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY TO AVOID DIRECT CONNECTION OF OMS AND RCS TANKS.
A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE, WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 502 ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K47, 46; K55, K54

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE OX TK XFEED "B" VALVE AND LOSS OF LT & RT RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY (TO AVOID DIRECT CONNECTION OF ALL OMS AND RCS TANKS). WITH ONE OMS CROSSFEED VALVE FAILED OPEN, A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 503

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K47, 46; K55, K54

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, REDUNDANT RELAY WILL MAINTAIN PROPER CONTROL TO CLOSE OX TK XFEED VLV B.
LOSS OF ALL REDUNDANCY, WORST CASE, WOULD BE A MOMENTARY CLOSURE OF XFEED VLV'S A & B (LT/RT) DURING A BURN.
PROPER XFEED OPERATION CAN BE RESTORED BY PLACING THE OMS XFEED A OR B (LT/RT) SWITCH IN THE OPEN POSITION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 504

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K45, 44; K53, K52

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE ONE OF TWO ELECTRICAL PATHS TO OPEN LT/RT OX TK XFEED VLV B. LOSS OF ALL REDUNDANCY HAS THE SAME RESULT AS LT/RT TK XFEED VALVES FAILING CLOSED (LOSS OF MISSION) RESULTING IN LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE TO TO OPEN OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS AND COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE TK STRUCTURAL AND MASS PROPERTY VIOLATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 505

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115K45, 44; K53, K52

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN FAILED OPEN OX TK XFEED "B" VALVES AND LOSS OF ANY RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY TO AVOID DIRECT CONNECTION OF OMS AND RCS TANKS.
A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE, WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 506

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K45, 46; K61, 62

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT OX TK ISO A VALVE. LOSS OF ALL REDUNDANCY RESULTS IN LT/RT OX TK ISO A AND B VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14, MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 507

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K45, 46; K61, 62

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED CLOSED RELAY K45 OR 46/K61 OR 62 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN A CLOSURE OF OX TANK ISOL VALVE A & B (LT/RT).
THIS FAILURE CAN BE CORRECTED BY PLACEMENT OF LT/RT OMS TK ISOL SWITCH A & B INTO THE OPEN POSITION. DURING TIME CRITICAL ABORT DUMPS AN OME SHUT DOWN COULD OCCUR BEFORE PROPER ACTION IS TAKEN AND RESULT IN LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14, MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 508

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K47, 48; K63, 64

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED OPEN RELAY K47 OR 48/K63 OR 64 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN AN INABILITY TO OPEN OX TANK ISOL VALVE A & B (LT/RT).
THIS PRECLUDES USE/DEPLETION OF OMS PROP RESULTING IN VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14, MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 509 ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114K47, 48; K63, 64

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT OX TK ISO A VALVE (LT/RT). LOSS OF ALL REDUNDANCY RESULTS IN LT/RT OX TK ISO A AND B VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14, MC284-0430 REV E AMENDMENT F-07

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 510 ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K70, 71; K62, 63

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT OX TK B VALVE. LOSS OF ALL REDUNDANCY RESULTS IN LT/RT OX TK ISOL A AND B VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 511

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K72, 73; K64, 65

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO CLOSE LT/RT OX TK B VALVE. LOSS OF ALL REDUNDANCY RESULTS IN LT/RT OX TK ISOL A AND B VALVES FAILED OPEN. VALVES ARE NORMALLY OPEN. THE ONLY EFFECT A FAILED OPEN VALVE COULD HAVE IS AN UNDESIRABLE INTERCONNECT/CROSSFEED CONFIGURATION TO AFFECTED POD (DIRECT CONNECTION OF TANKS). OMS XFEED CAN STILL BE PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 512

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS CLOSED (STUCK IN ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/3 | AOA: | 3/1R |
| DEORBIT: | 3/3 | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K72, 73; K64, 65

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED CLOSED RELAY K72 OR 73/K65 OR 64 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN A CLOSURE OF OX TANK ISOL VALVE A & B (LT/RT).
THIS FAILURE CAN BE CORRECTED BY PLACEMENT OF LT/RT OMS TK ISOL SWITCH A & B INTO THE OPEN POSITION. DURING TIME CRITICAL ABORT DUMPS AN OME SHUT DOWN COULD OCCUR BEFORE PROPER ACTION IS TAKEN AND RESULT IN LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 513 ABORT: 3/1R

ITEM: RELAY
FAILURE MODE: FAILS OPEN (RELAY FAILS TO ENERGIZE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RELAY
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116K70, 71; K62, 63

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILED OPEN RELAY K70 OR 71/K62 OR 63 (LT/RT) HAS NO EFFECT ON VALVE OPERATION. A FAILURE OF ALL REDUNDANCY RESULTS IN AN INABILITY TO OPEN OX TANK ISOL VALVE A & B (LT/RT).
THIS PRECLUDES USE/DEPLETION OF OMS PROP RESULTING IN VIOLATION OF STRUCTURAL AND MASS PROPERTIES CONSTRAINTS DURING ENTRY.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 514 ABORT: 3/1R

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-94; 56V76A116 J1-38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
BARBER POLE TALKBACK TO CREW FALSELY INDICATES THAT EITHER THE OX VLV, FU VLV, OR BOTH VLV'S ARE FAILED PARTIALLY OPEN/PARTIALLY CLOSED. GPC TALKBACK TO CREW STILL OPERATIONAL.
WORST CASE IS VLVS DECLARED FAILED CLOSED AND REDUNDANT VLVS ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 515

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-94; 56V76A116 J1-38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 516

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-43; 56V76A116 J3-10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 517

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-43; 56V76A116 J3-10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATE LT/RT FU VALVE A DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 518

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-43; 56V76A116 J3-10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATE LT/RT FU VALVE A DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 519

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-43; 56V76A116 J3-10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 520

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-52; J2-73

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
BARBER POLE TALKBACK TO CREW FALSELY INDICATES THAT EITHER THE OX VLV, FU VLV, OR BOTH VLV'S ARE FAILED PARTIALLY OPEN/PARTIALLY CLOSED. GPC TALKBACK TO CREW STILL OPERATIONAL.
WORST CASE IS VLVS DECLARED FAILED CLOSED AND REDUNDANT VLVS ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 521

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-52; J2-73

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 522

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 55V76A115 J3-56; J3-41

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 523

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 55V76A115 J3-56; J3-41

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATE LT/RT FU VALVE B DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED CLOSE THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 524

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J3-56; J3-41

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATE LT/RT FU VALVE B DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 525

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J3-56; J3-41

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 526

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-24; J1-21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 527 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-24; J1-21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACKS STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 528 ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-28; J3-74

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBERPOLE TALKBACK STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE FROM LOSS OF VEHICLE CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 529

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-28; J3-74

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 530

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-28; J3-74

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBERPOLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE FROM LOSS OF VEHICLE CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 531

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-28; J3-74

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 532

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-88; J1-42

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL B POSITION INDICATION DS6/DS8 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "B" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 533

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-88; J1-42

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACKS STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 534

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-69; J3-54

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 535 ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-69; J3-54

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBERPOLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 536 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-69; J3-54

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 537

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) FU TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-69; J3-54

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBERPOLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 538 ABORT: 3/1R

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-60; 56V76A116 J1-77

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATES LT/RT OX AND FU VALVE A STUCK PARTIALLY OPEN/PARTIALLY CLOSED. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL.
WORST CASE IS VLVS DECLARED FAILED CLOSED AND REDUNDANT VLVS ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSELY BE FAILED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 539

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-60; 56V76A116 J1-77

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 540

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-46; 56V76A116 J1-57

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE LT/RT XFEED A SWITCH CLOSED TALKBACK. LOSS OF ALL REDUNDANCY WOULD RESULT IN HAVING TO RELY ON VLV TALKBACKS TO DETERMINE SWITCH "CLOSE" OPERATIONS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 541 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-46; 56V76A116 J1-57

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 542 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-35; 56V76A116 J1-56

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
WOULD FALSELY INDICATE LOSS OF ONE OF TWO REDUNDANT ELECTRICAL PATHS TO OVERRIDE THE GPC AND OPEN OX AND FU TK XFEED VLV'S A. LOSS OF ALL REDUNDANCY WOULD RESULT IN HAVING TO RELY ON VLV TALKBACKS TO DETERMINE SWITCH "OPEN" OPERATION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 543

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-35; 56V76A116 J1-56

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 544

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-62; J2-68

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATES LT/RT OX AND FU VALVE B STUCK PARTIALLY OPEN/PARTIALLY CLOSED. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL.
WORST CASE IS VLVS DECLARED FAILED CLOSED AND REDUNDANT VLVS ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY FAILED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 545

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-62; J2-68

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 546

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-30; J2-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE LT/RT XFEED B SWITCH CLOSED TALKBACK. LOSS OF ALL REDUNDANCY WOULD RESULT IN HAVING TO RELY ON VLV TALKBACKS TO DETERMINE SWITCH "CLOSE" OPERATION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 547 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-30; J2-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 548 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-21; J2-45

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
WOULD FALSELY INDICATE LOSS OF ONE OF TWO REDUNDANT ELECTRICAL PATHS TO OVERRIDE THE GPC AND OPEN OX AND FU TK XFEED VLV'S B. LOSS OF ALL REDUNDANCY WOULD RESULT IN HAVING TO RELY ON VLV TALKBACKS TO DETERMINE SWITCH "OPEN" OPERATION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 549

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-21; J2-45

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 550

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-8; J1-98

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE (LT/RT) OMS TK ISOL A SWITCH POSITION (CLOSE) TALKBACK. SWITCH POSITION CAN BE DETERMINED UTILIZING A VALVE POSITION TALKBACKS.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 551

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-8; J1-98

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH POSITION TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 552

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-16; J1-95

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE (LT/RT) OMS TK ISOL A SWITCH POSITION (OPEN) TALKBACK. SWITCH POSITION CAN BE DETERMINED UTILIZING A VALVE POSITION TALKBACK.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 553

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-16; J1-95

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH POSITION TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 554

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-14; J3-12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE (LT/RT) OMS TK ISOL B SWITCH POSITION (CLOSE) TALKBACK. SWITCH POSITION CAN BE DETERMINED UTILIZING B VALVE POSITION TALKBACKS.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 555

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-14; J3-12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACKS STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 556

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-18; J3-11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE (LT/RT) OMS TK ISOL B SWITCH POSITION TALKBACK. SWITCH POSITION CAN BE DETERMINED UTILIZING B VALVE POSITION TALKBACK.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 557

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-18; J3-11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH POSITION TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 558 ABORT: 3/1R

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-67; 56V76A116 J1-28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
BARBER POLE TALKBACK TO CREW FALSELY INDICATES THAT EITHER THE OX VLV, FU VLV, OR BOTH VLV'S ARE FAILED PARTIALLY OPEN/PARTIALLY CLOSED. GPC TALKBACK TO CREW STILL OPERATIONAL.
WORST CASE IS VLVS DECLARED FAILED CLOSED AND REDUNDANT VLVS ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY FAILED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 559

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J1-67; 56V76A116 J1-28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 560

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-42; 56V76A116 J3-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 561

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-42; 56V76A116 J3-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATE LT/RT OX VALVE A DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 562

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-42; 56V76A116 J3-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATES LT/RT OX VALVE A DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 563

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76A114 J3-42; 56V76A116 J3-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 564

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-65; J2-83

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
BARBER POLE TALKBACK TO CREW FALSELY INDICATES THAT EITHER THE OX VLV, FU VLV, OR BOTH VLV'S ARE FAILED PARTIALLY OPEN/PARTIALLY CLOSED. GPC TALKBACK TO CREW STILL OPERATIONAL.
WORST CASE IS VLVS DECLARED FAILED CLOSED AND REDUNDANT VLVS ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY BE FAILED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 565

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J2-65; J2-83

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 566

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J3-55; J3-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 567

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J3-55; J3-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATES LT/RT OX VALVE B DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 568

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J3-55; J3-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
SWITCH TALKBACK TO GPC CONTINUALLY INDICATES LT/RT OX VALVE B DOES NOT OPEN. BARBER POLE TALKBACK TO CREW STILL OPERATIONAL. WORST CASE IS VLV DECLARED FAILED CLOSED AND REDUNDANT VLV IS USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSELY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD BE FALSELY FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 569

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK CROSSFEED B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, MCA 2
PART NUMBER: 55V76A115 J3-55; J3-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 570

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-6; J1-32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 571

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-6; J1-32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACKS STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 572

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-18; J1-39

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBER POLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 573

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J1-18; J1-39

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 574 ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-27; J3-75

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 575

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-27; J3-75

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBER POLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 576

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-27; J3-75

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBER POLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 577

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL A VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1
PART NUMBER: 54V76A114 J3-27; J3-75

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 578

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-72; J1-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBERPOLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN A LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 579

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 1.2K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-72; J1-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 580

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-98; J1-43

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL B POSITION INDICATION DS6/DS8 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "B" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 581

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 1.2K 2W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-98; J1-43

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACKS STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 582

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-46; J3-55

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 583

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 12K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 12K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-46; J3-55

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBERPOLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 584

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-46; J3-55

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ASSOCIATED VALVE TALKBACK TO GPC (LT/RT), CREW BARBERPOLE TALKBACK STILL AVAILABLE. A LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF TALKBACK TO GPC AND CREW FOR OX TK ISOL VALVES A & B. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/CREW).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 585

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX TK ISOL B VLVS
5) RESISTOR, 5.1K 1/4W
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76A116 J1-46; J3-55

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, VALVE TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 586 ABORT: 3/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN GPC POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU CROSSFEED A VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S26; S28

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO OVERRIDE THE GPC COMMANDS FOR LT/RT OMS XFEED A VALVES. GPC COMMANDS AND REDUNDANT VALVES STILL AVAILABLE TO SUPPORT XFEED FUNCTION. LOSS OF ALL REDUNDANCY, WORST CASE, WOULD RESULT IN LOSS OF MISSION DUE TO LOSS OF XFEED CAPABILITY (LOSE OMS ENGINE REDUNDANCY AND RCS PROP MGR TECHNIQUES). DURING RTLS AND TAL LOSE THE ABILITY TO PERFORM TIME CRITICAL PROPELLANT DUMPS THROUGH THE RCS JETS RESULTING IN LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-974099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 587 ABORT: 3/2R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN OPEN POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU CROSSFEED A VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S26; S28

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE OX TK XFEED "A" VALVE AND LOSS OF LT & RT RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY (TO AVOID DIRECT CONNECTION OF ALL OMS AND RCS TANKS). WITH ONE OMS CROSSFEED VALVE FAILED OPEN, A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE, WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-974099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 588 ABORT: 2/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN CLOSED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU CROSSFEED A VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S26; S28

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT (PRIORITY FLIGHT INVOKED). LOSS OF ALL REDUNDANCY IS LOSS OF MISSION DUE TO LOSS OF OMS CROSSFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (PARALLEL VALVE FAILS TO OPEN) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS AND POSSIBLE INABILITY TO COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATION OF PROP TK STRUCTURAL AND ORBITAL MASS PREPERTIES CONSTRAINS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 589

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN GPC POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU CROSSFEED B VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S27; S29

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO OVERRIDE THE GPC COMMANDS FOR LT/RT OMS XFEED B VALVES. GPC COMMANDS AND REDUNDANT VALVES STILL AVAILABLE TO SUPPORT XFEED FUNCTION. LOSS OF ALL REDUNDANCY WORST CASE WOULD RESULT IN LOSS OF MISSION DUE TO LOSS OF XFEED CAPABILITY (LOSE OMS ENGINE REDUNDANCY AND RCS PROP MGR TECHNIQUES). DURING RTLS AND TAL LOSE THE ABILITY TO PERFORM TIME CRITICAL PROPELLANT DUMPS THROUGH THE RCS JETS RESULTING IN LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 590 ABORT: 3/2R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN OPEN POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU CROSSFEED B VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S27; S29

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE OX TK XFEED "B" VALVE AND LOSS OF LT & RT RCS CROSSFEED CAPABILITY DURING AN OMS BURN TO AVOID A DIRECT CONNECTION OF OMS AND RCS TANKS. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED CAPABILITY (TO AVOID DIRECT CONNECTION OF ALL OMS AND RCS TANKS). WITH ONE OMS CROSSFEED VALVE FAILED OPEN, A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE, WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 591

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 2/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN CLOSED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU CROSSFEED B VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S27; S29

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT (PRIORITY FLIGHT INVOKED). LOSS OF ALL REDUNDANCY IS LOSS OF MISSION DUE TO LOSS OF OMS CROSSFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (PARALLEL VALVE FAILS TO OPEN) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO DUMP OMS PROP THROUGH RCS JETS. POSSIBLE INABILITY TO COMPLETE TIME CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATION OF PROP TK STRUCTURAL AND ORBITAL MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 592

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN GPC POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S19; S21

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSE ABILITY TO OVERRIDE THE GPC COMMANDS FOR LT/RT OMS TK ISOL A VALVES. GPC COMMANDS AND REDUNDANT VALVE STILL AVAILABLE. LOSS OF ALL REDUNDANCY, WORST CASE, WOULD RESULT IN LOSS OF VEHICLE/LIFE DUE TO STRANDED PROPELLANTS. INABILITY TO USE/DEPLETE
PROPELLANT CAN LEAD TO VIOLATION OF PROPELLANT TANK STRUCTURAL AND ORBITER MASS PROPERTIES.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-974099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 593

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN OPEN POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S19; S21

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE OX & FU TK "A" VALVE. NO EFFECT, VALVES ARE NORMALLY OPEN DURING ALL PHASES. A FAILED VALVE COULD RESULT IN LOSS OF CROSSFEED TO AFFECTED POD (TO AVOID DIRECT CONNECTION OF TANKS).

A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-974099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 594

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN CLOSED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S19; S21

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE TANK ISOL A VALVE STUCK IN CLOSE POSITION. WITH FAILURE TO OPEN ONE TANK ISOL VALVE, ONE FAILURE AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE
PROPELLANT RESULTING IN POSSIBLE VIOLATIONS OF PROPELLANT TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 595

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN GPC POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S20; S22

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSE ABILITY TO OVERRIDE THE GPC COMMANDS FOR LT/RT OMS TK ISOL B VALVES. GPC COMMANDS AND REDUNDANT VALVE STILL AVAILABLE. LOSS OF ALL REDUNDANCY, WORST CASE, WOULD RESULT IN LOSS OF LIFE/VEHICLE DUE TO STRANDED PROPELLANTS. INABILITY TO USE/DEPLETE
PROPELLANT CAN LEAD TO VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 596 ABORT: 3/3

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN OPEN POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S20; S22

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN AN INABILITY TO CLOSE THE OX & FU TK ISOL "B" VALVE. NO EFFECT, VALVES ARE NORMALLY OPEN DURING ALL PHASES. A FAILED OPEN VALVE COULD RESULT IN LOSS OF CROSSFEED TO AFFECTED POD (TO AVOID DIRECT CONNECTION OF TANKS).

A SECOND FAILURE, A FAILED OPEN RCS CROSSFEED VALVE WOULD REQUIRE THE USE OF TANK ISOL VALVES TO AVOID CONNECTION OF OMS AND RCS TANKS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 597

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: SWITCH TOGGLE LT/RT
FAILURE MODE: FAILS TO SWITCH (STUCK IN CLOSED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) SWITCH TOGGLE LT/RT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 2/1R |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-S20; S22

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE TK ISOL "B" VALVE STUCK IN CLOSE POSITION. WITH FAILURE TO OPEN ONE TANK ISOL VALVE, ONE FAILURE AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO USE/DEPLETE PROP RESULTING IN POSSIBLE VIOLATIONS OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MF0004-400 REV C, VS70-97099 EO A09

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/06/87
SUBSYSTEM: OMS
MDAC ID: 598

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUSE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) TOTALIZER
5) FUSE, 3A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132F17; 56V76A133F9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE PRIMARY POWER SUPPLY FOR TOTALIZER, SECONDARY STILL AVAILABLE. POWER SUPPLIES ARE CROSS-STRAPPED.
LOSS OF ALL REDUNDANCY IS NOT CONSIDERED FEASIBLE SINCE IT WOULD REQUIRE LOSS OF GROUND CALCULATIONS FROM FLOW RATE-BURN TIME DATA THEREFORE THE WORST CASE EFFECT WOULD BE LOSS OF ALL QUANTITY GAGE DATA EXCEPT GND CALCULATIONS, NO EFFECT ON MISSION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/06/87
SUBSYSTEM: OMS
MDAC ID: 599

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) TOTALIZER
5) FUSE, 3A
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131F15; F16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE SECONDARY POWER SUPPLY FOR TOTALIZER, PRIMARY STILL AVAILABLE. POWER SUPPLIES ARE CROSS-STRAPPED.
LOSS OF ALL REDUNDANCY IS NOT CONSIDERED FEASIBLE SINCE IT WOULD REQUIRE LOSS OF GROUND CALCULATIONS FROM FLOW RATE-BURN TIME DATA THEREFORE THE WORST CASE EFFECT WOULD BE LOSS OF ALL QUANTITY GAGE DATA EXCEPT GND CALCULATIONS, NO EFFECT ON MISSION.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 600 ABORT: 3/1R

ITEM: INDICATOR, POSITION BARBERPOLE TALKBACK
FAILURE MODE: ERRONEOUS INDICATION (FAILS HIGH, FAILS LOW, FAILS MIDTRAVEL)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED A VLVS
5) INDICATOR, POSITION BARBERPOLE TALKBACK
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-DS12; DS14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSLEY INDICATES EITHER THE OX VLV, THE FU VLV OR BOTH VLV'S FAILED TO OPEN WHEN COMMANDED AND HAVE FAILED PARTIALLY CLOSED.
WORST CASE IS VLV'S DECLARED FAILED CLOSED AND REDUNDANT VLV'S ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSLY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSLY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 601 ABORT: 3/1R

ITEM: INDICATOR, POSITION BARBERPOLE TALKBACK
FAILURE MODE: ERRONEOUS INDICATION (FAILS HIGH, FAILS LOW, FAILS MIDTRAVEL)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK CROSSFEED B VLVS
5) INDICATOR, POSITION BARBERPOLE TALKBACK
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/3 | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-DS13; DS15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
BARBERPOLE TALKBACK TO CREW FALSLEY INDICATES EITHER THE OX VLV, THE FU VLV OR BOTH VLV'S FAILED TO OPEN WHEN COMMANDED AND HAVE FAILED PARTIALLY CLOSED.
WORST CASE IS VLV'S DECLARED FAILED CLOSED AND REDUNDANT VLV'S ARE USED TO COMPLETE XFEED. LOSS OF ALL REDUNDANCY COULD RESULT IN FALSLY FAILING THE XFEED SYSTEM RESULTING IN LOSS OF MISSION. DURING ABORTS THE XFEED SHOULD NOT BE DECLARED FAILED AND THE DUMP SHOULD TAKE PLACE REGARDLESS OF INDICATIONS, BUT SINCE THE XFEED COULD FALSLY BE FAILED CLOSED THE RESULT IS LOSS OF VEHICLE/LIFE FOR RTLS & TAL.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 602 ABORT: 3/3

ITEM: INDICATOR, POSITION BARBERPOLE TALKBACK
FAILURE MODE: ERRONEOUS INDICATION (FAILS HIGH, FAILS LOW, FAILS MIDTRAVEL)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL A VLVS
5) INDICATOR, POSITION BARBERPOLE TALKBACK
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-DS5; DS7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS
(ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87
SUBSYSTEM: OMS
MDAC ID: 603

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: INDICATOR, POSITION BARBERPOLE TALKBACK
FAILURE MODE: ERRONEOUS INDICATION (FAILS HIGH, FAILS LOW, FAILS MIDTRAVEL)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) OX & FU TK ISOL B VLVS
5) INDICATOR, POSITION BARBERPOLE TALKBACK
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL O8
PART NUMBER: 33V73A8-DS6; DS8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
CREW LT/RT OMS ISOL A POSITION INDICATION DS5/DS7 WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FUEL OR OX "A" VALVES ARE STUCK PARTIALLY OPEN/CLOSE OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES.
LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS
(ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12; VS70-976102 REV F EO G14

C-7

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: OMS
MDAC ID: 604

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: METER, FRCS/OMS KIT PRESSURE
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) METER, FRCS/OMS KIT PRESSURE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 03 M10
PART NUMBER: 33V76A3-M10

CAUSES: VIBRATION, MECHANICAL SHOCK, ELECTROMAGNETIC FIELDS, MISHANDLING/ABUSE

EFFECTS/RATIONALE:
GAGE M10 PROVIDES A FALSE INDICATION OF RCS HE AND ULLAGE PRESSURES (ALSO KIT ULLAGE PRESSURES). TWO OTHER REDUNDANT MEASUREMENT PATHS ARE AVAILABLE FOR EACH FRCS HE TK AND ONE REDUNDANT PATH FOR FU/OX ULLAGE PRESSURES. RESPECTIVE MSID #'S ARE V42P1113C&V42P1114C/V42P1110C & V42P1112C AND V42P1116C/V42P1115C. FOR ERRONEOUS INDICATIONS FROM ALL REDUNDANCY; 1ST DUE TO THE TIME CRITICALITY DURING ASCENT, MCC WOULD DECLARE FRCS FAILED (REF FLIGHT RULE 6-41) RESULTING IN PROP MGR IN THE APS, THEREFORE LOSS OF MISSION CAPABILITIES, 2ND FOR OTHER PHASES IT IS ASSUMED MCC WOULD MONITOR FRCS PROP TK OUT PRESSURE FOR HE TK HEALTH.

REFERENCES: VS70-942099 REV C E0 D01 ; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: OMS
MDAC ID: 605

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: METER, LT OMS/RCS PRESSURE
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) METER, LT OMS/RCS PRESSURE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 03 M9
PART NUMBER: 33V73A3-M9

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
GAGE M9 PROVIDES A FALSE INDICATION OF LT OMS/RCS PROPELLANT ULLAGE AND LT RCS HE TANK PRESSURES. REDUNDANT GPC MEASUREMENT PATHS ARE AVAILABLE (LT OMS FU/OX V43P4321C/V43P4221C, LT RCS FU/OX V42P2116C/V42P2115C, LT RCS HE TANK OX/FU V42P2110C, V42P2112C/V42P2113C, V422114C). ERRONEOUS INDICATION FROM LOSS OF ALL REDUNDANCY IN PL & OO PHASES WOULD RESULT IN LTRCS HE TK BEING DECLARED FAILED RESULTING IN A LOSS OF DELTA V AND LOSS OF MISSION CAPABILITY (REF. FLIGHT RULE 6-41), UNLESS SENSOR FAILURE IS DETERMINED.

REFERENCES: VS70-942099 REV C E0 D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/16/86
SUBSYSTEM: OMS
MDAC ID: 606

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: METER, RCS/OMS PROPELLANT QUANTITY GAUGE
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) METER, RCS/OMS PROPELLANT QUANTITY GAUGE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 03 M12
PART NUMBER: 33V73A3-M12

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO SELECT OMS/RCS/KIT PROPELLANT QUANTITY FOR VISUAL DISPLAY ON METER M12. THERE ARE TWO OTHER REDUNDANT MEASUREMENT PATHS FOR THE OMS AND ONE REDUNDANT PATH FOR RCS. IN THE OMS, ONE PATH IS THROUGH THE GPC THE OTHER HARDWIRED TO THE GSE PNL (J207). LOSS OF ALL QUANTITY PATHS HAS NO EFFECT SINCE GROUND CALCULATIONS WOULD STILL BE AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: OMS
MDAC ID: 607

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: METER, RT OMS/RCS PRESSURE
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) METER, RT OMS/RCS PRESSURE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 03 M11
PART NUMBER: 33V73A3-M11

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
GAGE M11 PROVIDES A FALSE INDICATION OF RT OMS/RCS PROPELLANT ULLAGE AND RT RCS HE TANK PRESSURES. REDUNDANT GPC MEASUREMENT PATHS ARE AVAILABLE (RT OMS FU/OX V43P5321C/V43P5221C, RT RCS FU/OX V42P3116C/V42P3115C, RT RCS HE TANK OX/FU V42P3110C, V42P3112C/V42P3113C, V42P3114C). ERRONEOUS INDICATION FROM LOSS OF ALL REDUNDANCY IN PL & OO PHASES WOULD RESULT IN RT RCS HE TK BEING DECLARED FAILED RESULTING IN A LOSS OF DELTA V AND LOSS OF MISSION CAPABILITY (REF. FLIGHT RULE 6-41), UNLESS SENSOR FAILURE IS DETERMINED.

REFERENCES: VS70-942099 REV C E0 D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 608 ABORT: 3/3

ITEM: SENSOR PRESSURE, OMS FUEL TK ULLAGE
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) SENSOR PRESSURE, OMS FUEL TK ULLAGE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PROPELLANT FUEL TANK
PART NUMBER: 51V43PT403, 52V43PT503

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO UTILIZE PT403/PT503 FOR FU ULLAGE PRESSURE MEASUREMENT. COULD FALSELY INDICATE FU LEAKAGE. THE WORST CASE WOULD BE A FAILURE WHEN THE FU TK ISO VALVES ARE CLOSED DURING RCS CROSSFEED FROM OTHER POD.
UNDER THESE CONDITIONS NO OTHER PRESSURE MEASUREMENTS ARE AVAILABLE TO MONITOR TK STATUS. TO DETERMINE SENSOR FAILURE THE HE ISO VALVE MUST BE OPENED WHILE MONITORING HE TK PRESSURE MEASUREMENTS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 609

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR PRESSURE, OX TANK ULLAGE
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) SENSOR PRESSURE, OMS OX TK ULLAGE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PROPELLANT OXIDIZER TANK
PART NUMBER: 51V43PT404, 52V43PT504

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO UTILIZE PT404/PT504 FOR OX ULLAGE PRESSURE MEASUREMENT. COULD FALSELY INDICATE OX LEAKAGE. THE WORST CASE WOULD BE A FAILURE WHEN THE OX TK ISOL VALVES ARE CLOSED DURING RCS CROSSFEED FROM OTHER POD.
UNDER THESE CONDITIONS NO OTHER PRESSURE MEASUREMENTS ARE AVAILABLE TO MONITOR TK STATUS. TO DETERMINE SENSOR FAILURE THE HE ISO VALVES MUST BE OPENED WHILE MONITORING HE TK PRESSURE MEASUREMENTS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 610

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, FUEL TANK LOWER
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) SENSOR TEMPERATURE, FUEL TANK LOWER
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PROPELLANT FUEL TANK
PART NUMBER: 51V43TT405, 52V43TT505

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF MISSION WOULD OCCUR IN THE LIFTOFF PHASE. A SENSOR FAILURE COULD INCORRECTLY LEAD TO FAILING OMS FU PROPELLANT TANK (REF: JSC 20923 PCN-1, RULE 6-2) LEADING TO THE ESTABLISHMENT OF A SHALLOW ATO BEFORE SENSOR FAILURE IS DETERMINED

REFERENCES: VS70-943099 REV EO B12; JSC 20923 PCN-1; 73A760210 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 611

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, OX LOWER TANK
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) SENSOR TEMPERATURE, OX LOWER TANK
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PROPELLANT OXIDIZER TANK
PART NUMBER: 51V43TT404, 52V43TT504

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF MISSION WOULD OCCUR IN THE LIFTOFF PHASE. A SENSOR FAILURE COULD INCORRECTLY LEAD TO FAILING OMS OX PROPELLANT TANK (REF: JSC 20923 PCN-1, RULE 6-2) LEADING TO THE ESTABLISHMENT OF A SHALLOW ATO BEFORE SENSOR FAILURE IS DETERMINED.

REFERENCES: VS70-943099 REV EO B12; JSC 20923 PCN-1; 73A760210 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: OMS
MDAC ID: 612

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH ROTARY, RCS/OMS PRESS
FAILURE MODE: FAILS TO SWITCH; (POLES STUCK IN ONE OF THREE POSITION OR POLES FAIL TO MAKE CONTACT IN ANY POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) SWITCH ROTARY, RCS/OMS PRESS
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 03 S10
PART NUMBER: 33V73A3-S10

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO UTILIZE GAGES M9, M10, AND M11 FOR MONITORING. REDUNDANT MEASUREMENTS ARE AVAILABLE THROUGH GPC AND ARE PART OF THE C&W SYSTEM. THE LOSS OF ALL SIGNAL PATHS FOR OMS RT/LT/KIT PROP ULLAGE, RCS RT/LT/FWD PROP ULLAGE AND RCS RT/LT/FWD HE TK PRESSURE WOULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS SINCE THE ACTUAL STATUS OF THE SYSTEMS ARE UNAVAILABLE.

REFERENCES: VS70-942099 REV C E0 D01; VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/16/86
SUBSYSTEM: OMS
MDAC ID: 613

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SWITCH ROTARY, RCS/OMS PROPELLANT QUANTITY GAUGE
FAILURE MODE: FAILS TO SWITCH; (POLES STUCK IN ONE OF THREE POSITION OR POLES FAIL TO MAKE CONTACT IN ANY POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) PROP STOR & DIST SUBSYSTEM
4) SWITCH ROTARY, RCS/OMS PROPELLANT QUANTITY GAUGE
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 03 S11
PART NUMBER: 33V73A3-S11

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO SELECT OMS/RCS/KIT PROPELLANT QUANTITY FOR VISUAL DISPLAY ON METER M12. THERE ARE TWO OTHER REDUNDANT MEASUREMENT PATHS FOR THE OMS AND ONE REDUNDANT PATH FOR RCS. IN THE OMS, ONE PATH IS THROUGH THE GPC THE OTHER HARDWIRED TO THE GSE PNL (J207). LOSS OF ALL QUANTITY PATHS HAVE NO EFFECT SINCE GROUND CALCULATIONS WOULD STILL BE AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 614

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J3-108; 56V76A123 J3-94

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE ONE OF TWO ELECTRICAL PATHS FOR PERFORMING AN OMS BURN WITHOUT PERFORMING A GN2 PURGE POST BURN.
LOSS OF ALL REDUNDANCY RESULTS IN INABILITY TO PERFORM AN OMS BURN WITHOUT A GN2 PURGE. NO EFFECT ON MISSION WITHOUT FIRST HAVING A FAILURE IN THE N2 SYSTEM.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 615

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J3-108; 56V76A123 J3-94

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, STILL MAINTAIN FULL CAPABILITY. LOSS OF ALL REDUNDANCY, WORST CASE, WOULD RESULT IN THE INABLITY TO PERFORM A PURGE AFTER AN OMS BURN.
FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABLITY TO PERFORM TIME CRITICAL PROP DUMPS, LOSS OF VEHICLE/LIFE (1/1).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 616

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J3-107; 56V76A123 J3-95

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF TWO ELECTRICAL PATHS FOR PERFORMING AN OMS BURN WITHOUT A PURGE. NEXT FAILURE OF REDUNDANT ELEMENT, WORST CASE, WOULD RESULT IN THE INABILITY TO PERFORM A PURGE AFTER AN OMS BURN. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS, LOSS OF LIFE/VEHICLE (2/1R).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 617

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J3-107; 56V76A123 J3-95

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF TWO ELECTRICAL PATHS FOR PERFORMING AN OMS BURN WITHOUT A PURGE. NEXT FAILURE OF REDUNDANT ELEMENT, WORST CASE, WOULD RESULT IN THE INABILITY TO PERFORM A PURGE AFTER AN OMS BURN. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS, LOSS OF LIFE/VEHICLE (2/1R).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 618

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J3-94; 54V76A121 J3-94

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE ONE OF TWO ELECTRICAL PATHS FOR PERFORMING AN OMS BURN WITHOUT PERFORMING A GN2 PURGE POST BURN.
LOSS OF ALL REDUNDANCY RESULTS IN INABILITY TO PERFORM AN OMS BURN WITHOUT A GN2 PURGE. NO EFFECT ON MISSION WITHOUT FIRST HAVING A FAILURE IN THE N2 SYSTEM.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 619

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 2/1R

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 2/1R |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J3-94; 54V76A121 J3-94

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, STILL MAINTAIN FULL CAPABILITY. LOSS OF ALL REDUNDANCY, WORST CASE, WOULD RESULT IN THE INABLITY TO PERFORM A PURGE AFTER AN OMS BURN.
FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABLITY TO PERFORM TIME CRITICAL PROP DUMPS, LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 620

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DIODE
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J3-95; 54V76A121 J3-95

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR PERFORMING AN OMS BURN WITH A PURGE. NEXT FAILURE OF REDUNANT ELEMENT, WORST CASE, WOULD RESULT IN THE INABILITY TO PERFORM A PURGE AFTER AN OMS BURN. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS, LOSS OF LIFE/VEHICLE (2/1R).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 621

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) DIODE
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J3-95; 54V76A121 J3-95

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF TWO ELECTRICAL PATHS FOR PERFORMING AN OMS BURN WITHOUT A PURGE. NEXT FAILURE OF REDUNDANT ELEMENT, WORST CASE, WOULD RESULT IN THE INABILITY TO PERFORM A PURGE AFTER AN OMS BURN. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS, LOSS OF LIFE/VEHICLE (2/1R).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 622

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/2R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 2 VLVS
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-J' TYPE III; 56V76A123AR J11-FF (130) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE CAUSES ENGINE PURGE VLV TO BE FAILED CLOSED AND IS NO EFFECT. AFFECTED ENGINE LOST FOR 10 MINUTES AFTER SHUTDOWN TO ALLOW FOR SUBLIMATION OF FROZEN PROP IN ENGINE LINES. OTHER ENGINE AVAILABLE IF BURN REQUIRED WITHIN 10 MINUTES. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF BOTH ENGINES FOR 10 MINUTES AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 623

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 2 VLVS
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-J' TYPE III; 56V76A123AR J11-FF (130) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE CAUSES THE ENG PURGE VLV TO BE FAILED OPEN AND IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANT, INABILITY TO MAINTAIN OPEN BI-PROP VALVES, AND LOSS OF BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE OF SERIES VALVE TO REMAIN CLOSED) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF GN2 PRESSURANT IN ONE POD. LOSS OF AFFECTED ENGINE, AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 624 ABORT: 3/2R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1 VLVS
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/2R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J11-G; 56V76A123 J11-R (142) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE CAUSES ENGINE PURGE VLV TO BE FAILED CLOSED AND IS NO EFFECT. AFFECTED ENGINE IS LOST FOR 10 MINUTES AFTER SHUTDOWN TO ALLOW FOR SUBLIMATION OF FROZEN PROP IN ENGINE LINES. OTHER ENGINE AVAILABLE IS BURN REQUIRED WITHIN 10 MINUTES. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF BOTH ENGINES FOR 10 MINUTES AFTER BURNS. CRIT 1/1 FOR MANUAL TAL CONTINGENCY OMS DUMP PURGE REQUIREMENT.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 625

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1 VLVS
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J11-G; 56V76A123 J11-R (142) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE CAUSES THE ENG PURGE VLV TO BE FAILED OPEN AND IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL GN2 PRESSURANT, INABILITY TO MAINTAIN OPEN BI-PROP VALVES, AND LOSS OF BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (FAILURE OF SERIES VALVE TO REMAIN CLOSED) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF GN2 PRESSURANT IN ONE POD, LOSS OF AFFECTED ENGINE, AND POSSIBLE INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER MASS PROPERTIES CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 626

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-E' TYPE III; 56V76A123AR J6-NN (133) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AN ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 627

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-E' TYPE III; 56V76A123AR J6-NN (133) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF ONE DRIVER RESULTS IN HAVING TO PLACE EITHER THE ARM/PRESS OR THE ENG VLV SWITCH IN THE OFF POSITION TO CLOSE ENG CONTROL VLV NO. 2. FAILURE OF ALL REDUNDANCY RESULTS IN ALL ENG CONTROL VLV'S FAILED OPEN REQUIRING THE CLOSURE OF THE TK ISO VLV'S TO STOP THE BURN. OMS PROPELLANT OR ENGINE ARE NO LONGER AVAILABLE SINCE REOPENING OF THE TK ISO VLV'S COULD RESULT IN SEVERE POD DAMAGE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 628

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-F' TYPE III; 56V76A123AR J6-PP (134) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 629

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-F' TYPE III; 56V76A123AR J6-PP (134) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF DRIVER RESULTS IN HAVING TO PLACE EITHER THE ARM/PRESS SWITCH OR THE ENG VLV SWITCH IN THE OFF POSITION TO CLOSE ENG CONTROL VLV NO. 2. FAILURE OF ALL REDUNDANCY RESULTS IN ALL ENG CONTROL VLV'S FAILED OPEN REQUIRING THE CLOSURE OF THE TK ISO VLV'S TO STOP THE BURN. OMS PROPELLANT OR ENGINE ARE NO LONGER AVAILABLE SINCE REOPENING OF THE TK ISO VLV'S COULD RESULT IN SEVERE POD DAMAGE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 630

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J3-109 TYPE III; 56V76A123AR J3-93 (134) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 631

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J3-109 TYPE III; 56V76A123AR J3-93 (134) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO DIRECTLY SHUT DOWN THE OME DURING A BURN. IF A MALFUNCTION OCCURRED, LOW PC AND DELTA V, THE PLACEMENT OF THE ARM/PRESS SWITCH TO THE OFF POSITION WOULD INSTRUCT THE GPC TO PERFORM SHUT DOWN. LOSS OF ALL REDUNDANCY RESULTS IN GPC CMDS AS THE ONLY METHOD FOR OME SHUTDOWN.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 632

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-D TYPE III; 56V76A123AR J6-MM (135) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS TO OPEN GN2 PRESS ISOL VALVE. FOR LOSS OF ALL REDUNDANCY EFFECT IS THE SAME AS GN2 PRESS ISOL VLV FAILING CLOSED RESULTING IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES (ACCUMULATOR IS CONSIDERED REDUNDANT TO GN2 ISOL VLV). THEREFORE POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND CG CONSTRAINTS DURING DEORBIT.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 633

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-D TYPE III; 56V76A123AR J6-MM (135) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT (GN2 PRESS ISO VLV IS STUCK IN THE OPEN POSITION) REGULATOR LOCKS UP AND STOPS FLOW. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF DOWNSTREAM LINES OR DAMAGE TO COMPONENTS RESULTING IN LOSS OF GN2 PRESSURANT AND/OR INABILITY TO START ENGINES.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 634

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J6-NN TYPE III; 54V76A121AR J11-E TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 635

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J6-NN TYPE III; 54V76A121AR J11-E TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF DRIVER RESULTS IN HAVING TO PLACE EITHER THE ARM/PRESS SWITCH OR THE ENG VLV SWITCH IN THE OFF POSITION TO CLOSE ENG CONTROL VLV NO. 2. FAILURE OF ALL REDUNDANCY RESULTS IN ALL ENG CONTROL VLV'S FAILED OPEN REQUIRING THE CLOSURE OF THE TK ISO VLV'S TO STOP THE BURN. OMS PROPELLANT OR ENGINES ARE NO LONGER AVAILABLE SINCE REOPENING OF THE TK ISO VLV'S COULD RESULT IN SEVERE POD DAMAGE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 636

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J6-MM TYPE III; 54V76A121AR J11-F TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 637

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1 VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/1R | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/1R |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/1R | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J6-MM TYPE III; 54V76A121AR J11-F TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF DRIVER RESULTS IN HAVING TO PLACE EITHER THE ARM/PRESS SWITCH OR THE ENG VLV SWITCH IN THE OFF POSITION TO CLOSE ENG CONTROL VLV NO. 2. FAILURE OF ALL REDUNDANCY RESULTS IN ALL ENG CONTROL VLV'S FAILED OPEN REQUIRING THE CLOSURE OF THE TK ISO VLV'S TO STOP THE BURN. OMS PROPELLANT OR ENGINES ARE NO LONGER AVAILABLE SINCE REOPENING OF THE TK ISO VLV'S COULD RESULT IN SEVERE POD DAMAGE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 638

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J3-93 TYPE III; 54V76A121AR J3-93 TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 639

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J3-93 TYPE III; 54V76A121AR J3-93 TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO DIRECTLY SHUT DOWN THE OME DURING A BURN. IF A MALFUNCTION OCCURRED, LOW PC AND DELTA V, THE PLACEMENT OF THE ARM/PRESS SWITCH TO THE OFF POSITION WOULD INSTRUCT THE GPC TO PERFORM SHUT DOWN. LOSS OF ALL REDUNDANCY RESULTS IN GPC CMDS AS THE ONLY METHOD FOR OME SHUTDOWN.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 640

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J6-KK TYPE III; 54V76A121AR J11-G TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS TO OPEN GN2 PRESS ISOL VALVE. FOR LOSS OF ALL REDUNDANCY EFFECT IS THE SAME AS GN2 PRESS ISOL VLV FAILING CLOSED RESULTING IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES (ACCUMULATOR IS CONSIDERED REDUNDANT TO GN2 ISOL VLV) THEREFORE POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND CG CONSTRAINTS DURING DEORBIT.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 641

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122AR J6-KK TYPE III; 54V76A121AR J11-G TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT (GN2 PRESS ISOL VLV IS STUCK IN THE OPEN POSITION) REGULATOR LOCKS UP AND STOPS FLOW. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF DOWNSTREAM LINES OR DAMAGE TO COMPONENTS RESULTING IN LOSS OF GN2 PRESSURANT AND/OR INABILITY TO START ENGINES.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 642

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 FILL/VENT VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-K' TYPE III; 54V76A123AR J11-GG (129) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ABILITY TO OPEN GN2 FILL/VENT VALVE. WORST CASE EFFECT WOULD BE A LAUNCH DELAY.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 643

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 FILL/VENT VLV
6) DRIVER, HYBRID
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121AR J11-K' TYPE III; 54V76A123AR J11-GG (129) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
THE FAILURE'S END RESULT WOULD BE A STUCK OPEN FILL/VENT VALVE. THERE ARE TWO REMAINING SEALS TO PROTECT THE SYSTEM FROM GN2 LOSS. FOR LOSS OF ALL REDUNDANCY, POSSIBLE LOSS OF VEHICLE/LIFE DUE TO LOSS OF BOTH OME START CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 644

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) FUSE, 1A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PNL O14 S9; PNL O16 S7
PART NUMBER: 33V73A14F13; 33V73A16F11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 645

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV & GN2 ENG CNTRL 1/2 VLV & OME PURGE 1/2 VLVS
6) FUSE, 1A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL C3A1 S1; S2
PART NUMBER: 35V73A3A1F1; F3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PURGE CAPABILITY FOR ASSOCIATED LT/RT OME. IF A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN, THE OMS RM WOULD INCORRECTLY SHUTDOWN GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE DURING DEORBIT RESULTING IN POSSIBLE LOSS OF LIFE/VEHICLE. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 646

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) FUSE, 1A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PNL O14 S9; PNL O16 S7
PART NUMBER: 33V73A14F14; 33V73A16F12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
THE LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 647

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV & GN2 ENG CNTRL 1/2 VLV & OME PURGE 1/2 VLVS
6) FUSE, 1A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL C3A1 S1; S2
PART NUMBER: 35V73A3A1F2; F4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PURGE CAPABILITY FOR ASSOCIATED LT/RT OME. IF A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN, THE OMS RM WOULD INCORRECTLY SHUTDOWN THE GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILURED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE DURING DEORBIT RESULTING IN POSSIBLE LOSS OF VEHICLE/LIFE. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14; FSSR STS83-0010A PART D 30 JUNE 85; FSSR STS 81-0026 CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 648

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1 VLV
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J11-E'; 56V76A123 J6-NN (133)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 649

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J11-F'; 56V76A123 J6-PP (132)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 650

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J6-NN; 54V76A J11-E (121)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 651

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J6-MM; 54V76A J11-F (121)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ONE OF TWO ELECTRICAL PATHS FOR THE OPERATION OF ENGINE CONTROL VALVES 1 AND 2.
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF BOTH OME'S THEREFORE LOSS OF VEHICLE/LIFE DUE TO LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES AND INABILITY TO COMPLETE TIME CRITICAL OMS DUMP DURING ABORTS RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. FOR ABORTS; ONE FAILURE AWAY FROM LOSS OF ONE OME RESULTING IN INABILITY TO PERFORM DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 652

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6) RESISTOR, 1.2K 2W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J8-24; 56V76A123R J8-24 (101)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE TALKBACK FOR ENGINE PURGE VALVE, OPERATION CAN BE INDIRECTLY DETERMINED BY MONITORING ENGINE AND N2 TANK PRESSURE SENSORS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 653

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6) RESISTOR, 1.2K 2W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J8-24; 56V76A123R J8-24 (101)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 654

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV & GN2 ENG CNTRL 1 VLV
6) RESISTOR, 1.2K 2W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J8-41; 56V76A123 J8-26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
TALKBACKS FOR THE ENGINE CONTROL NO. 1 AND ENGINE PRESS ISOL VALVES WOULD FALSELY INDICATE VALVES FAILED CLOSED. THE ENGINE CONTROL VALVE OPERATION CAN BE DETERMINED BY MONITORING OME OPERATION.
A FALSE INDICATION OF AN ENGINE PRESS ISOL VALVE FAILED CLOSE COULD RESULT IN FAILING THE ASSOCIATED OME FOR ALL BURNS EXCEPT DEORBIT, NO EFFECT ON MISSION.
LOSS OF ALL REDUNDANCY WOULD FALSELY INDICATE A FAILURE IN BOTH OME'S GN2 SYSTEM. AT THIS POINT THE NEXT OMS BURN SHOULD BE PERFORMED WITH SETP, FOR DETERMINATION OF OME HEALTH, NO EFFECT ON MISSION.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 655

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) RESISTOR, 1.2K 2W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J8-41; 56V76A123 J8-26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 656

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) RESISTOR, 1.2K 2W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J8-26; 54V76A121 J8-26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE VALVE TALKBACK. VALVE OPERATION CAN BE DETERMINED BY MONITORING BALL VALVE POSITION INDICATOR. FOR LOSS OF ALL REDUNDANCY, VALVE POSITION CAN BE INDIRECTLY DETERMINED FROM OME OPERATION.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 657

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 2 VLV
6) RESISTOR, 1.2K 2W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J8-26; 54V76A121 J8-26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 658

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-16; 56V76A123R J2-5 (102)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
THE TALKBACK FOR THE LT/RT OMS ENGINE VLV CREW SWITCH WOULD FALSELY INDICATE A SWITCH FAILURE. ACTUAL ABILITY TO PERFORM AN OMS BURN WITH ASSOCIATED ENGINE IS UNKNOWN UNTIL A BURN IS PERFORMED.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 659

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-16; 56V76A123R J2-5 (102)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK FOR THE OMS ENGINE VLV CREW SWITCH STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 660

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-17 TO GND; 56V76A123 J2-6 TO GND

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 661

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-17 TO GND; 56V76A123 J2-6 TO GND

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN. THE OMS RM WOULD INCORRECTLY SHUTDOWN THE GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE DURING DEORBIT RESULTING IN POSSIBLE LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 662

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-18; 56V76A123 J2-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PURGE CAPABILITY FOR ASSOCIATED LT/RT OME. A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN. THE OMS RM WOULD INCORRECTLY SHUTDOWN THE GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE RESULTING IN POSSIBLE LOSS OF VEHICLE/LIFE. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 663

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) OME PURGE 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-18; 56V76A123 J2-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 664

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-17 TO J3-108; 56V76A123 J2-6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN. THE OMS RM WOULD INCORRECTLY SHUTDOWN THE GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE DURING DEORBIT RESULTING IN POSSIBLE LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 665

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1; AV BAY 6, LCA 3
PART NUMBER: 54V76A121 J2-17 TO J3-108; 56V76A123 J2-6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 666

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J2-6 TO GND; 54V76A121 J2-6 TO GND

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT. A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN. THE OMS RM WOULD INCORRECTLY SHUTDOWN THE GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE DURING DEORBIT RESULTIN IN POSSIBLE LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14, FSSR STS 83,0010A, PART D, 30 JUNE 85; FSSR STS 81-0026 CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 667

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J2-6 TO J3-94; 54V76A121 J2-6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE NO EFFECT. A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN. THE OMS RM WOULD INCORRECTLY SHUTDOWN THE GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE DURING DEORBIT RESULTING IN POSSIBLE LOSS OF VEHICLE/LIFE.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14, FSSR STS 83,0010A, PART D, 30 JUNE 85; FSSR STS 81-0026 CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 668

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J2-6 TO J3-94; 54V76A121 J2-6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14, FSSR STS 83,0010A, PART D, 30 JUNE 85; FSSR STS 81-0026 CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 669

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLVS
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J2-6 TO GND; 54V76A121 J2-6 TO GND

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 670

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 2/2 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J2-7; 54V76A121 J2-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PURGE CAPABILITY FOR ASSOCIATED LT/RT OME. A 2ND FAILURE OCCURS IN THE OTHER POD'S ARM/PRESS SYSTEM DURING AN OMS BURN TRIGGERING THE FDI SYSTEM AND REQUIRING MANUAL SHUTDOWN. THE OMS RM WOULD INCORRECTLY SHUTDOWN THE GOOD POD AND NOT PERFORM THE OME GN2 PURGE. THE RESULT WOULD BE A FAILURED POD WHICH CANNOT BE USED AND A GOOD POD WHICH CANNOT BE USED FOR 10 MINUTES. THIS COULD CAUSE YOU TO MISS DESIRED TARGETS DURING OMS 1 INSERTION OR CAUSE AN OVERSHOOT OF THE LANDING SITE RESULTING IN POLLIBLE LOSS OF VEHICLE/LIFE. FOR A MANUAL TAL THE LOSS OF THE PURGE RESULTS IN AN INABILITY TO PERFORM TIME CRITICAL PROP DUMPS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14; FSSR STS83-0010A PART D 30 JUNE 85; FSSR STS 81-0026 CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 671

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV
6) RESISTOR, 5.1K 1/4W
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 4, LCA 1
PART NUMBER: 55V76A122 J2-7; 54V76A121 J2-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, SIGNAL STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14, FSSR STS 83,0010A, PART D, 30 JUNE 85; FSSR STS 81-0026 CR29378A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 672 ABORT: 3/1R

ITEM: SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2)
FAILURE MODE: FAILS TO SWITCH (STUCK IN ARM/PRESS POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV & GN2 ENG CONTRL 1/2 VLVS & OME PURGE 1/2 VLVS
6) SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/1R |
| LIFTOFF: | 3/2R | TAL: | 3/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PNL C3A1
PART NUMBER: 35V73A3A1-S1; S2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE CAPABILITY TO INHIBIT THE LT/RT ENGINE PURGE AFTER AN OME BURN AND TO CLOSE LT/RT GN2 PRESS ISOL VLV. ON/OFF SELECTION STILL AVAILABLE THROUGH LT/RT OMS ENG VLV SWITCH S9/S7, NO MISSION IMPACT.
LOSS OF ALL REDUNDANCY IS THE SAME EFFECT AS GN2 PRESS ISOL VLV FAILING OPEN (FAILS TO CLOSE) RESULTING IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF DOWNSTREAM LINES OR DAMAGE TO COMPONENTS RESULTING IN LOSS OF GN2 PRESSURANT AND/OR INABILITY TO START ENGINES.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14; MF0004-400 REV C (EEE PL)

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 673

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2)
FAILURE MODE: FAILS TO SWITCH (STUCK IN ARM POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV & GN2 ENG CONTRL 1/2 VLVS & OME PURGE 1/2 VLVS
6) SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 2/1R |
| LIFTOFF: | 3/2R | TAL: | 2/1R |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PNL C3A1
PART NUMBER: 35V73A3A1-S1; S2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE IS NO EFFECT, REMAINING ENGINE START (IN ACCUMULATOR) SAVED FOR DEORBIT. LOSS OF ALL REDUNDANCY IS THE SAME EFFECT AS GN2 ISOL VLV FAILING CLOSED RESULTING IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF START CAPABILITY FOR BOTH ENGINES. WITH FIRST FAILURE DURING RTLS OR TAL, ONE FAILURE (ACCUMULATOR) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ENGINE AND INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS. ACCUMULATOR PROVIDES FAIL-SAFE PROTECTION FOR UPSTREAM FAILURES AND IS CONSIDERED REDUNDANT.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14; MF0004-400 REV C (EEE PL)

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 674

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2)
FAILURE MODE: FAILS TO SWITCH (STUCK IN OFF POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG PRESS ISOL VLV & GN2 ENG CONTRL 1/2 VLVS & OME PURGE 1/2 VLVS
6) SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL C3A1
PART NUMBER: 35V73A3A1-S1; S2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN AN INABILITY TO OPERATE THE ASSOCIATED LT/RT BI-PROP BALL VLV RESULTING IN LOSS OF ONE ENGINE. ONE FAILURE (RT/LT ARM/PRESS SWITCH FAILURE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES AND THEREFORE LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE. LOSS OF AN ENGINE RESULTS IN AN INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14; MF0004-400 REV C (EEE PL)

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 675

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: SWITCH, OMS LT/RT ENG CONTROL VLV
FAILURE MODE: FAILS TO SWITCH (STUCK IN OFF POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) SWITCH, OMS LT/RT ENG CONTROL VLV
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 3/2R | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 2/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014;016
PART NUMBER: 33V73A14-S9; 33V73A16-S7

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN AN INABILITY TO OPERATE THE ASSOCIATED LT/RT BI-PROP BALL VLV RESULTING IN LOSS OF ONE ENGINE. ONE FAILURE (RT/LT ARM/PRESS SWITCH FAILURE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF BOTH ENGINES AND THEREFORE LOSS OF DEORBIT CAPABILITY WHEN ABOVE RCS REDLINES. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE. LOSS OF AN ENGINE RESULTS IN AN INABILITY TO COMPLETE TIME-CRITICAL OMS DUMP RESULTING IN POSSIBLE VIOLATION OF PROP TANK STRUCTURAL AND ORBITER ENTRY CG CONSTRAINTS.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14; MF0004-400 REV C (EEE PL)

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/30/86
SUBSYSTEM: OMS
MDAC ID: 676

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH, OMS LT/RT ENG CONTROL VLV
FAILURE MODE: FAILS TO SWITCH (STUCK IN ON POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) GN2 ENG CNTRL 1/2 VLV
6) SWITCH, OMS LT/RT ENG CONTROL VLV
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PNL 014;016
PART NUMBER: 33V73A14-S9; 33V73A16-S7

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, THE OMS ARM/PRESS SWITCH STILL AVAILABLE TO TERMINATE OMS BURN IF NECESSARY.
LOSS OF ALL REDUNDANCY RESULTS IN INABILITY TO SHUT DOWN THE LT AND RT OME IN THE EVENT OF A SYSTEM MALFUNCTION. IF THE LOSS OF ALL REDUNDANCY IS DETECTED DURING ORBIT, THE OMS ENGINES SHOULD BE DECLARED FAILED ACCEPT ON AN AS ON NEED OPERATIONS BASIS FOR THE DEORBIT BURN.

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; VS70-976102 REV F EO G14; MF0004-400 REV C (EEE PL)

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 677

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (STANDBY)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 4, PCA 1
PART NUMBER: 55V76A132RPC16; 54V76A131RPC28

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS FOR THE SUPPLY OF TVC MTR PWR TO THE STANBY PITCH & YAW MOTORS.
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO CONTROL EITHER OME, THEREFORE DEORBIT CAPABILITY IS LOST WHEN ABOVE THE RCS REDLINES, LOSS OF VEHICLE/LIFE.
(FOR MANUAL TAL LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 678

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (STANDBY)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2; AV BAY 4, PCA 1
PART NUMBER: 55V76A132RPC16; 54V76A131RPC28

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER FROM STANDBY PITCH & YAW ACTUATOR CONTROL.
NO EFFECT UNLESS A FAILURE OF THE STANDBY CONTROLLER OCCURS, THEN BOTH ACTIVE AND STANDBY CONTROLLERS COULD BE IN CONFLICT AND RESULT IN LOSS OF ABILITY TO CONTROL OMS ENGINE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 679

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (STANDBY)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 4, PCA 1
PART NUMBER: 55V76A132RPC15; 54V76A131RPC27

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS FOR THE SUPPLY OF TVC MTR PWR TO THE STANBY PITCH & YAW MOTORS.
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO CONTROL EITHER OME, THEREFORE DEORBIT CAPABILITY IS LOST WHEN THE RCD REDLINES, LOSS OF VEHICLE/LIFE.
(FOR MANUAL TAL LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF VEHICLE/LIFE.)

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 680

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (STANDBY)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2; AV BAY 4, PCA 1
PART NUMBER: 55V76A132RPC15; 54V76A131RPC27

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER FROM STANDBY PITCH & YAW ACTUATOR CONTROL.
NO EFFECT UNLESS A FAILURE OF THE STANDBY CONTROLLER OCCURS, THEN BOTH ACTIVE AND STANDBY CONTROLLERS COULD BE IN CONFLICT AND RESULT IN LOSS OF ABILITY TO CONTROL OMS ENGINE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 681

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (ACTIVE)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 6, PCA 3
PART NUMBER: 54V76A133RPC25; 56V76A133RPC18

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS FOR THE SUPPLY OF TVC MTR PWR TO THE ACTIVE PITCH & YAW MOTORS.
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO CONTROL EITHER OME THEREFORE, DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS REDLINES, LOSS OF VEHICLE/LIFE.
(FOR MANUAL TAL LOSS OF ALL REDUNDANCY RESULTS IN 1/1.)

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 682

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (ACTIVE)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 6, PCA 3
PART NUMBER: 54V76A133RPC25; 56V76A133RPC18

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER FROM ACTIVE PITCH & YAW ACTUATOR CONTROL.
NO EFFECT UNLESS A FAILURE OF THE ACTIVE CONTROLLER OCCURS, THEN BOTH ACTIVE AND STANDBY CONTROLLERS COULD BE IN CONFLICT AND RESULT IN LOSS OF ABILITY TO CONTROL OMS ENGINE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 683

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (ACTIVE)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 6, PCA 3
PART NUMBER: 54V76A131RPC26; 56V76A133RPC17

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ONE OF TWO ELECTRICAL PATHS FOR THE SUPPLY OF TVC MTR PWR TO THE ACTIVE PITCH & YAW MOTORS.
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO CONTROL EITHER OME THEREFORE, DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS RELINES, LOSS OF VEHICLE/LIFE.
(FOR MANUAL TAL LOSS OF ALL REDUNDANCY RESULTS IN 1/1.)

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 684

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (ACTIVE)
6) CONTROLLER, REMOTE POWER
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 6, PCA 3
PART NUMBER: 54V76A131RPC26; 56V76A133RPC17

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER FROM ACTIVE PITCH & YAW ACTUATOR CONTROL.
NO EFFECT UNLESS A FAILURE OF THE ACTIVE CONTROLLER OCCURS, THEN BOTH ACTIVE AND STANDBY CONTROLLERS COULD BE IN CONFLICT AND RESULT IN LOSS OF ABILITY TO CONTROL OMS ENGINE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: OMS
MDAC ID: 685

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (STANDBY)
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 4, PCA 1
PART NUMBER: 55V76A132F16; 54V76A131F18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ELECTRICAL POWER TO CONTROL CIRCUITRY FOR TVC STANDBY PITCH & YAW MOTORS. ACTIVE TVC FOR OME AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO CONTROL EITHER OME THEREFORE DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS REDLINES, LOSS OF VEHICLE/LIFE. (MANUAL TAL LOSS OF ALL REDUNDANCY RESULTS IN 1/1.)

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/1R
MDAC ID: 686 ABORT: 3/1R

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) ACTUATOR DRIVE MOTOR PITCH & YAW (ACTIVE)
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 54V76A131F17; 56V76A133F10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE ELECTRICAL POWER TO CONTROL CIRCUITRY FOR THE TVC ACTIVE PITCH & YAW MOTORS. STANDBY TVC FOR OME AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO CONTROL EITHER OME THEREFORE DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS REDLINES, LOSS OF VEHICLE/LIFE. (FOR MANUAL TAL LOSS OF ALL REDUNDANCY RESULTS IN 1/1.)

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 687

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SENSOR PRESSURE, OMS ENGINE PNEUMATIC PRESSURE NO.1
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) SENSOR PRESSURE, OMS ENGINE PNEUMATIC PRESSURE NO.1
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43PT004, 52V43PT004

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO UTILIZE PT004 FOR GN2 TK PRESSURE MEASUREMENT. A REDUNDANT LT/RT PRESSURE MEASUREMENT IS AVAILABLE UTILIZING PT005 MEASUREMENT V43P4548C1/V43P5548C. IF ALL REDUNDANCY IS LOST (FAILS LOW INDICATING LOSS OF GN2) THE REAL STATUS OF THE OME N2 TK WILL BE UNAVAILABLE OR FALSELY INDICATED (LOSS OF N2) AND CAN RESULT IN FALSELY FAILING 2 OMS GN2 TKS LEAKING/FAILED, THEREFORE MISSION CAPABILITIES LOST OR ATO COULD BE CALLED (REF FLIGHT RULE 6-40).

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 688

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SENSOR PRESSURE, OMS ENGINE PNEUMATIC PRESSURE NO.2
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) SENSOR PRESSURE, OMS ENGINE PNEUMATIC PRESSURE NO.2
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43PT005, 52V43PT005

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO UTILIZE PT005 FOR GN2 TK PRESSURE MEASUREMENT. A REDUNDANT LT/RT PRESSURE MEASUREMENT IS AVAILABLE UTILIZING PT004 MEASUREMENT 43VP4547C/43VP5547C. IF ALL REDUNDANCY IS LOSE (FAILS LOW INDICATING LOSS OF GN2) THE REAL STATUS OF THE OME N2 TK WILL BE UNAVAILABLE OR FALSELY INDICATED (LOSS OF N2) AND CAN RESULT IN FALSELY FAILING 2 OMS GN2 TKS LEAKING/FAILED; THEREFORE, MISSION CAPABILITIES LOST OR ATO COULD BE CALLED (REF FLIGHT RULE 6-40).

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 689

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 1/1

ITEM: SENSOR PRESSURE, OMS ENGINE REG OUT
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) GN2 ASSEMBLY
5) SENSOR PRESSURE, OMS ENGINE REG OUT
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43PT006, 52V43PT006

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILURE OF PT006 COULD LEAD TO FALSELY FAILING ONE OMS ENGINE (SEE FLIGHT RULE 6-4, LINE FAILURE). FOR LO & OO LOSS OF AN OMS ENGINE WOULD RESULT IN LIMITING ATTITUDE TO RCS DEORBIT CAPABILITIES. LOSS OF REDUNDANCY IN THE DO PHASE COULD LEAD TO FAILURE OF TWO OMS ENGINES AND THEREFORE LOSS OF DEORBIT CAPABILITY IF ABOVE THE RCS REDLINE. LOSS OF ONE OMS ENGINE DURING RTLS & TAL WOULD RESULT IN INABILITY TO PERFORM TIME CRITICAL PROPELLANT DUMP.

REFERENCES: VS70-943099 REV A EO B12; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/06/87
SUBSYSTEM: OMS
MDAC ID: 690

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BI-PROP 2 VLVS
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132F20; 56V76A133F11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE POSITION INDICATION FOR (LT/RT) BI-PROP VALVE 2. LOSS OF ALL REDUNDANY RESULTS IN LOSS OF POSITION INDICATION FOR ALL BI-PROP VALVES LT & RT. NO LIMITATION WILL RESULT FROM THE FAILURE SINCE BI-PROP PERFORMANCE AND HEALTH CAN BE INDIRECTLY DETERMINED FROM ENGINE PERFORMANCE PARAMETERS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/06/87
SUBSYSTEM: OMS
MDAC ID: 691

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) BI-PROP 1 VLVS
6) FUSE, 3A
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131F13; F14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE POSITION INDICATION FOR (LT/RT) BI-PROP VALVE 1. LOSS OF ALL REDUNDANY RESULTS IN LOSS OF POSITION INDICATION FOR ALL BI-PROP VALVES LT & RT. NO LIMITATION WILL RESULT FROM THE FAILURE SINCE BI-PROP PERFORMANCE AND HEALTH CAN BE INDIRECTLY DETERMINED FROM ENGINE PERFORMANCE PARAMETERS.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 692

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: METER, RT/LT OME PRESSURE PC
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) METER, RT/LT OME PRESSURE PC
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL F7A5 M2
PART NUMBER: 34V73A7A5-M1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE VISUAL INDICATION OF PC. ENGINE HEALTH CAN STILL BE MONITORED UTILIZING BALL VALVE POSITON, DELTA V AND ENGINE TEMPERATURE.

REFERENCES: VS70-943099 REV A E0 B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 693

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SENSOR POSITION, BI-PROPELLANT VALVE 1
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR POSITION, BI-PROPELLANT 1 VALVES
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43LV1, 52V43LV1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FALSE INDICATION OF VALVE POSITION COULD LEAD TO LIMITING OMS ENGINE USE. THE ENGINE WILL BE USED ONLY IF THE OTHER ENGINE HAS FAILED AND THEN ONLY FOR THE DEORBIT BURN (REF FLIGHT RULE 6-26). LOSS OF ALL REDUNDANCY DURING LO OR OO PHASE WOULD LEAD TO FAILURE TO REACH DESIRED ALTITUDE, (LIMIT ATTITUDE TO RCS REDLINES TO ENSURE DEORBIT CAPABILITY).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 694

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SENSOR POSITION, BI-PROPELLANT VALVE 2
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR POSITION, BI-PROPELLANT 2 VALVES
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43LV2, 52V43LV2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FALSE INDICATION OF VALVE POSITION COULD LEAD TO LIMITING OMS ENGINE USE. THE ENGINE WILL BE USED ONLY IF THE OTHER ENGINE HAS FAILED AND THEN ONLY FOR THE DEORBIT BURN (REF FLIGHT RULE 6-26). LOSS OF ALL REDUNDANCY DURING LO OR OO PHASE WOULD LEAD TO FAILURE TO REACH DESIRED ALTITUDE, (LIMIT ATTITUDE TO RCS REDLINES TO ENSURE DEORBIT CAPABILITY).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 695

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR PRESSURE, OMS ENGINE CHAMBER
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR PRESSURE, OMS EMGINE CHAMBER
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OME
PART NUMBER: 51V43PT003, 52V43PT003

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF PC MEASUREMENT HIGH WILL BE CAUSE TO NO-GO FUTHER USE OF THE AFFECTED ENGINE FOR NONCRITICAL OMS BURNS IF THE OTHER OMS ENGINE IS STILL AVAILABLE (REF FLIGHT RULE 6-27). WITH THE LOSS OF PC THE CREW WOULD BE UNABLE TO DISCERN INSTRUMENTATION FROM A REAL PERFORMANCE PROBLEM DURING AN OMS BURN.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 696

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR PRESSURE, OMS ENGINE FU INLET PRESS
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR PRESSURE, OMS ENGINE FU INLET PRESS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OME
PART NUMBER: 51V43PT001, 52V43PT001

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO UTILIZE PT001 FOR FUEL INLET PRESSURE MEASUREMENT. THE MEASUREMENT IS USED FOR LEAK ISOLATION AND (IN CONJUNCTION WITH PC, FUEL INJECTOR TEMP AND BALL VALVE POSITION INDICATOR) FOR ISOLATION OF OX FLOW RESTRICTION.
FAILURE OF THE SENSOR SEVERELY DEGRADES CREW MONITORING CAPABILITY. DECREASED CAPABILITY TO DETERMINE FLOW RATE AND DISCERN BETWEEN ENGINE AND PROPELLANT FAILURES.
RECOMMEND THIS PRESSURE MEASUREMENT BE INCLUDED IN FLIGHT RULE 6-27.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 697

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR PRESSURE, OMS ENGINE OX INLET PRESS
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR PRESSURE, OMS ENGINE OX INLET PRESS
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OME
PART NUMBER: 51V43PT002, 52V43PT002

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO UTILIZE PT002 FOR OX INLET PRESSURE MEASUREMENT. THE MEASUREMENT IS USED FOR LEAK ISOLATION AND (INCONJUNCTION WITH PC, FUEL INJECTOR TEMP AND BALL VALVE POSITION INDICATOR) FOR ISOLATION OF OX FLOW RESTRICTION. FAILURE OF THE SENSOR SEVERELY DEGRADES CREW MONITORING CAPABILITY. DECREASED CAPABILITY TO DETERMINE FLOW RATE AND DISCERN BETWEEN ENGINE AND PROPELLANT FAILURES.
RECOMMEND THIS PRESSURE MEASUREMENT BE INCLUDED IN FLIGHT RULE 6-27.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 698

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: SENSOR TEMPERATURE ENGINE FUEL FEED LINE
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR TEMPERATURE, ENGINE FUEL FEED LINE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 1/1 |
| LIFTOFF: | 2/2 | TAL: | 1/1 |
| ONORBIT: | 2/1R | AOA: | 3/2R |
| DEORBIT: | 3/1R | ATO: | 2/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43TT002, 52V43TT002

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
WITH A FAILURE OF THE SENSOR, A FALSE TEMP INDICATION OF EITHER <25 F OR >130 F THE ASSOCIATED ENGINE WOULD BE DECLARED FAILED (REF JSC 20923 PCN-1, RULE 6-3) RESULTING IN LOSS OF FULL MISSION CAPABILITIES DUE TO IMPOSED PROP MGR TECHS TO ENSURE DEORBIT CAPABILITIES. FAILURE OF ALL REDUNDANCY COULD LEAD TO INCORRECTLY FAILING TWO OMS ENGINES AND IF THIS DECISION IS NOT REVERSED A POSSIBLE LOSS OF DEORBIT CAPABILITY WOULD RESULT THUS LOSS OF VEHICLE/CREW. FOR RTLS & OMS BOTH ENGINES ARE NEEDED TO DUMP PROP AND ESTABLISH WEIGHT & CG FOR ACCEPTABLE LANDING. CONSIDERING THE TIME ALLOWED DURING ABORTS ALL DECISIONS ARE TIME CRITICAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1; JSC-18958 84OCT1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 699

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, ENGINE FUEL INJECTOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR TEMPERATURE, ENGINE FUEL INJECTOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OME
PART NUMBER: 51V43TT001, 52V43TT001

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF FUEL INJECTOR TEMPERATURE FAIL HIGH/LOW WILL BE CAUSE TO NO-GO FURTHER USE OF THE AFFECTED ENGINE FOR NONCRITICAL OMS BURNS IF THE OTHER OME IS STILL AVAILABLE (REF FLIGHT RULE 6-27). FAILURE OF THE SENSOR SEVERELY DEGRADES CREW MONITORING CAPABILITY. AN ENGINE FAILURE COULD NOT BE DISTINGUISHED FROM A PROPELLANT FAILURE IF IT OCCURS DURING AN OMS BURN WITH THE AFFECTED ENGINE. THE ENGINE AND ASSOCIATED PROPELLANT SYSTEMS WOULD BE SUSPECT AND COULD NOT BE USED WITHOUT POSSIBLE DAMAGE TO GOOD ENGINE OR OMS POD.

REFERENCES: VS70-943099 REV A EO B12; JSC 18958 84OCT1; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 700

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, ENGINE OX VALVE
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR TEMPERATURE, ENGINE OX VALVE
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OME
PART NUMBER: 51V43TT003, 52V43TT003

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NO MISSION IMPACT. SENSOR PROVIDES A NONCRITICAL MEASUREMENT. FAILURE CAN BE DETERMINED BY INSPECTING OX FEED LN TEMP V43T4216A/V43T5216A AND ENGINE FU INJECTOR TEMP V43T4643A/V43T5643A SENSORS.

REFERENCES: VS70-943099 REV A EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 701

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, OX ENG INLET
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) OME ASSEMBLY
5) SENSOR TEMPERATURE, OX ENG INLET
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OME
PART NUMBER: 51V43TT407, 52V43TT507

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE DIRECT TEMP MEASUREMENT OF OX ENG INLET LN AND AN INDIRECT INDICATION OF THE OME COVER HTR SYSTEM. VALIDITY OF MEASUREMENT CAN BE DETERMINED FROM LN PRESS, OME COVER TEMP AND FUEL FEED LINE TEMP MEASUREMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E (ZONE 76-C); JSC 20923 PCN-1; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 702

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: SENSOR POSITION, ACTIVE PITCH ACTUATOR
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) SENSOR POSITION, ACTIVE PITCH ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43 ,52V43

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF POSITION SENSOR RESULTS IN LOSS OF ONE OF TWO REDUNDANT CONTROL CIRCUITS FOR OME TVC. LOSS OF ALL REDUNDANCY RESULTS IN INABILITY TO CONTROL EITHER OME THEREFORE, DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS REDLINES (FLIGHT & ATO).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 703

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: SENSOR POSITION, ACTIVE YAW ACTUATOR
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) SENSOR POSITION, ACTIVE YAW ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43 ,52V43

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF POSITION SENSOR RESULTS IN LOSS OF ONE OF TWO REDUNDANT CONTROL CIRCUITS FOR OME TVC. LOSS OF ALL REDUNDANCY RESULTS IN INABILITY TO CONTROL EITHER OME THEREFORE, DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS REDLINES (FLIGHT & ATO).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 704

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: SENSOR POSITION, STANDBY PITCH ACTUATOR
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) SENSOR POSITION, STANDBY PITCH ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43 ,52V43

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF POSITION SENSOR RESULTS IN LOSS OF ONE OF TWO REDUNDANT CONTROL CIRCUITS FOR OME TVC. LOSS OF ALL REDUNDANCY RESULTS IN INABILITY TO CONTROL EITHER OME THEREFORE, DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS REDLINES (FLIGHT & ATO).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/23/86
SUBSYSTEM: OMS
MDAC ID: 705

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: SENSOR POSITION, STANDBY YAW ACTUATOR
FAILURE MODE: ERRONEOUS OUTPUT ( OPEN, SHORTED, FAILS OUT OF TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) INSTRUMENTATION
3) OME SUBSYSTEM
4) TVC ASSEMBLY
5) SENSOR POSITION, STANDBY YAW ACTUATOR
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/2R | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/1R | ATO: | 3/1R |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME
PART NUMBER: 51V43 ,52V43

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF POSITION SENSOR RESULTS IN LOSS OF ONE OF TWO REDUNDANT CONTROL CIRCUITS FOR OME TVC. LOSS OF ALL REDUNDANCY RESULTS IN INABILITY TO CONTROL EITHER OME THEREFORE, DEORBIT CAPABILITY IS LOST WHEN ABOVE RCS REDLINES (FLIGHT & ATO).

REFERENCES: VS70-943099 REV A EO B12; MC621-0059 REV E

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 706

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-S' TYPE III O; 55V76A122AR J11-FF TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 707

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-S' TYPE III O; 55V76A122AR J11-FF TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 708

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-CC TYPE III O; 55V76A122AR J11-KK TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 709

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-CC TYPE III O; 55V76A122AR J11-KK TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 710

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-D' TYPE III O; 55V76A122AR J11-F TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 711

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-D' TYPE III O; 55V76A122AR J11-F TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 712

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-FF TYPE III O; 55V76A122AR J11-NN TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 713

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-FF TYPE III O; 55V76A122AR J11-NN TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 714

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-U' TYPE III O; 55V76A122AR J11-DD TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 715

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-V' TYPE III O; 55V76A122AR J11-EE TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 716

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-U' TYPE III O; 55V76A122AR J11-DD TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 717

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-V' TYPE III O; 55V76A122AR J11-EE TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 718

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-T' TYPE III O; 55V76A122AR J11-GG TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 719

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-T' TYPE III O; 55V76A122AR J11-GG TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 720

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-S' TYPE III; 54V76A123AR J11-S' (145) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 721

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-S' TYPE III; 54V76A123AR J11-S' (145) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 722

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-KK (151) TYPE III; 54V76A121AR J11-KK TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 723

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-KK (151) TYPE III; 54V76A121AR J11-KK TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 724

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J6-JJ (150) TYPE III; 54V76A121AR J11-H TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 725

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J6-JJ (150) TYPE III; 54V76A121AR J11-H TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 726

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-NN (155) TYPE III; 54V76A121AR J11-NN TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 727

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-NN (155) TYPE III; 54V76A121AR J11-NN TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 728

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-V' TYPE III; 54V76A123AR J11-V' (142) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 729 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-V' TYPE III; 54V76A123AR J11-V' (142) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 730 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-U' TYPE III; 54V76A123AR J11-U' (143) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 731 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-U' TYPE III; 54V76A123AR J11-U' (143) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 732 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-T' TYPE III; 54V76A123AR J11-T' (144) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 733

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122AR J11-T' TYPE III; 54V76A121AR J11-T' (144) TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 734

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J6-AA TYPE III O; 55V76A122AR J6-U' TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF THE HTR "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 DEG F AND POSSIBLE LOSS OF VEHICLE DUE TO STRUCTURAL DAMAGES. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 DEG F AN A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 DEG F UNDER SAME CONDITIONS. AND BOTH TYPES WILL EXCEED THE QUALIFIED TEMP OF 425 DEG F IN APPROXIMATELY 2 MIN.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 735

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J6-AA TYPE III O; 55V76A122AR J6-U' TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 736 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-EE TYPE III O; 55V76A122AR J11-MM TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF THE HTR "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 DEG F AND POSSIBLE LOSS OF VEHICLE LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 DEG F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 DEG F UNDER SAME CONDITIONS. AND BOTH TYPES WILL EXCEED THE QUALIFIED TEMP OF 425 DEG F IN APPROXIMATELY 2 MIN.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 737

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-EE TYPE III O; 55V76A122AR J11-MM TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 738

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-C TYPE III O; 55V76A122AR J11-G TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF THE HTR "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 DEG F AND POSSIBLE LOSS OF VEHICLE LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 DEG F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 DEG F UNDER SAME CONDITIONS. AND BOTH TYPES WILL EXCEED THE QUALIFIED TEMP OF 425 DEG F IN APPROXIMATELY 2 MIN.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 739

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-C TYPE III O; 55V76A122AR J11-G TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 740

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-BB TYPE III O; 55V76A122AR J11-JJ TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERTURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8' 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 741

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121AR J11-BB TYPE III O; 55V76A122AR J11-JJ TYPE III O

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 742 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J6-Y (153) TYPE III; 54V76A121AR J6-I TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF THE HTR "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING INA TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 DEG F AND POSSIBLE LOSS OF VEHICLE DUE TO STRUCTURAL DAMAGES. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 DEG F AN A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 DEG F UNDER SAME CONDITIONS. AND BOTH TYPES WILL EXCEED THE QUALIFIED TEMP OF 425 DEG F IN APPROXIMATELY 2 MIN.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 743

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J6-Y (153) TYPE III; 54V76A121AR J6-I TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 744

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-MM (154) TYPE III; 54V76A121AR J11-MM TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF THE HTR "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 DEG F AND POSSIBLE LOSS OF VEHICLE LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 DEG F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 DEG F UNDER SAME CONDITIONS. AND BOTH TYPES WILL EXCEED THE QUALIFIED TEMP OF 425 DEG F IN APPROXIMATELY 2 MIN.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 745

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-MM (154) TYPE III; 54V76A121AR J11-MM TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 746

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J6-KK (147) TYPE III; 54V76A121AR J11-J TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF THE HTR "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 DEG F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 DEG F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 DEG F UNDER SAME CONDITIONS. AND BOTH TYPES WILL EXCEED THE QUALIFIED TEMP OF 425 DEG F IN APPROXIMATELY 2 MIN.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 747

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J6-KK (147) TYPE III; 54V76A121AR J11-J TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 748 ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-JJ (148) TYPE III; 54V76A121AR J11-JJ TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERTURE EXCEEDING THE POD STRUCTUAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 749

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123AR J11-JJ (148) TYPE III; 54V76A121AR J11-JJ TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 750

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT GSE SERVICE PANEL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123F J11-HH; 54V76A121F J11-HH

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A FAILED OFF CONDITION FOR THE GSE HTR SYSTEM WHICH IS CONSIDERED A FAIL OPERATIONAL CONDITION SINCE NO TEMPERATURE LIMITS WILL BE EXCEEDED. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 751

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT GSE SERVICE PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121F J11-AA; 55V76A122F J11-HH

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A FAILED OFF CONDITION FOR THE GSE HTR SYSTEM WHICH IS CONSIDERED A FAIL OPERATIONAL CONDITION SINCE NO TEMPERATURE LIMITS WILL BE EXCEEDED. LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 752

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT LOWER Y-WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121F J11-GG; 55V76A122F J11-PP

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE OMS POD AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 753

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT LOWER Y-WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123F J11-PP; 54V76A121F J11-PP

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE OMS POD AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 754

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT OME GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121F J11-W'; 55V76A122F J11-CC

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF OME COVER HTR SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. THE OME COVER HTR'S ARE NOT A CRITICAL HTR SYSTEM, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 755

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT OME GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121F J11X'; 55V76A122F J11R'

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ENGINE SERVICE PANEL HTR SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. THE ENGINE SERVICE PNL HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 756

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT OME GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122F J11-W'; 56V76A123F J11-W'

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF OME COVER HTR SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. THE OME COVER HTR'S ARE NOT A CRITICAL HTR SYSTEM, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 757

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT OME GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122F J11-X'; 56V76A123F J11-X'

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ENGINE SERVICE PANEL HTR SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. THE ENGINE SERVICE PNL HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 758

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT UPPER Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121F J6-LL; 55V76A122F J6-L

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PART OF THE UPPER Y-WEB SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. SECOND FAILURE WILL RESULT IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT. (SEE FLIGHT RULE 6-10)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 759

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT UPPER Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1; AV BAY 5, LCA 2
PART NUMBER: 54V76A121F J6-I'; 55V76A122F J6-AA

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PART OF THE UPPER Y-WEB SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. SECOND FAILURE WILL RESULT IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT. (SEE FLIGHT RULE 6-10)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 760

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT UPPER Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122F J6-LL; 56V76A123F J6-LL

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PART OF THE UPPER Y-WEB SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. SECOND FAILURE WILL RESULT IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT. (SEE FLIGHT RULE 6-10)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 761

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A, LT/RT UPPER Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122F J6-I'; 56V76A123F J6-U'

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF PART OF THE UPPER Y-WEB SYSTEM (LT/RT) HTR'S. REDUNDANT HTR GROUP AVAILABLE. SECOND FAILURE WILL RESULT IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT. (SEE FLIGHT RULE 6-10)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 762

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, KEEL WEB & LOWER Y-WEB ,GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 4, PCA 1
PART NUMBER: 56V76A133F4; 54V76A131F22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE LOWER Y-WEB AND KEEL WEB AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 763

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT GSE SERVICE PNL & RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F10; 55V76A132F4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 764

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT GSE SERVICE PNL & RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 4, PCA 1
PART NUMBER: 56V76A133F2; 54V76A131F19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 765

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT KEEL WEB & LOWER Y-WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F11; 55V76A132F1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE LOWER Y-WEB AND KEEL WEB AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 766

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F9; 55V76A132F3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION).

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 767

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F8; 55V76A132F9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 768

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F7; 55V76A132F10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 769

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 4, PCA 1
PART NUMBER: 56V76A133F1; 54V76A131F20

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION).

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 770 ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 56V76A132F6; 54V76A133F8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 771

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 56V76A132F19; 54V76A133F6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURE AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.
OF THE SEVEN KEEL WEB HYBRID DRIVERS THERE ARE THREE OF WHICH A FAILURE OF ANY ONE WOULD NOT BE DETECTABLE IN FLIGHT (THE FAILURE WOULD NOT RESULT IN AN UNSAFE CONDITION.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 772

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT OME GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F6; 55V76A132F11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A FAILED OFF CONDITION FOR THE OME HTR SYSTEM, REDUNDANT HTR GROUP AVAILABE. THE OME HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 773

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT OME GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 56V76A132F18; 54V76A133F7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A FAILED OFF CONDITION FOR THE OME HTR SYSTEM, REDUNDANT HTR GROUP AVAILABE. THE OME HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 774

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F12; 55V76A132F2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 775

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 4, PCA 1
PART NUMBER: 56V76A133F3; 54V76A131F21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 776

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT UPPER Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131F5; 55V76A132F12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF UPPER Y WEB HTR'S, REDUNDANT HTR GROUP AVAILABLE. SECOND FAILURE WOULD RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT (REF FLIGHT RULE 6-10).

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 777

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A, LT/RT UPPER Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2; AV BAY 6, PCA 3
PART NUMBER: 55V76A132F5; 56V76A133F5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF UPPER Y WEB HTR'S, REDUNDANT HTR GROUP AVAILABLE. SECOND FAILURE WOULD RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT (REF FLIGHT RULE 6-10).

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 778

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 3A, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S1
PART NUMBER: 36V73A14F3; F16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN FAILURE OF THE GROUP 1 HTR'S. SECOND FAILURE RESULTS IN LOSS OF BOTH HTR GROUPS AND THEREFORE LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 779

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 3A, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S1
PART NUMBER: 36V73A14F1; F14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GROUP 1 HTR'S. SECOND FAILURE RESULTS IN LOSS OF BOTH HTR GROUPS AND THEREFORE LOSS OF MISSION DUE TO INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 780

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 3A, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S2; S5
PART NUMBER: 36V73A14F7; F20

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN FAILURE OF THE GROUP 2 HTR'S. SECOND FAILURE RESULTS IN LOSS OF BOTH HTR GROUPS AND THEREFORE LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 781

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 3A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 3A, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S2; S5
PART NUMBER: 36V73A14F5; F18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN FAILURE OF THE GROUP 2 HTR'S. SECOND FAILURE RESULTS IN LOSS OF BOTH HTR GROUPS AND THEREFORE LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 782 ABORT: 3/3

ITEM: HEATER, LT/RT ENG SERV PNL GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT ENG SERV PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: ENGINE SERVICE PANEL
PART NUMBER: 51V43HR 119, 121, 123, 125; 52V43HR 120, 122, 124, 126

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE ENGINE SERVICE PANEL HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 783 ABORT: 3/3

ITEM: HEATER, LT/RT ENG SERV PNL GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT ENG SERV PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: ENGINE SERVICE PANEL
PART NUMBER: 51V43HR 119, 121, 123, 125; 52V43HR 120, 122, 124, 126

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE ENGINE SERVICE PANEL HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 784 ABORT: 3/3

ITEM: HEATER, LT/RT ENG SERV PNL GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT ENG SERV PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: ENGINE SERVICE PANEL
PART NUMBER: 51V43HR 119, 121, 123, 125; 52V43HR 120, 122, 124, 126

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE ENGINE SERVICE PANEL HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 785 ABORT: 3/3

ITEM: HEATER, LT/RT ENG SERV PNL GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT ENG SERV PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: ENGINE SERVICE PANEL
PART NUMBER: 51V43HR 119, 121, 123, 125; 52V43HR 120, 122, 124, 126

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE ENGINE SERVICE PANEL HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 786 ABORT: 3/3

ITEM: HEATER, LT/RT GSE SERVICE PNL GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT GSE SERVICE PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43HR115, 129, 131, 133; 52V43HR116, 130, 132, 134

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF HTR MIGHT NOT BE DETECTABLE. WORST CASE WOULD BE LOSS OF ASSOCIATED GSE SERVICE PNL GROUP HTRS. THE REMAINING HTR SYSTEMS ARE CAPABLE OF MAINTAINING PROPER THERMAL ENVIRONMENT.
LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PRPOPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 787

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT GSE SERVICE PNL GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT GSE SERVICE PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43HR115, 129, 131, 133; 52V43HR116, 130, 132, 134

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN FAILED OFF CONDITION FOR GSE SEVICE PANEL HTR SYSTEM. THE GSE SERVICE PNL HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM. REMAINING HTR SYSTEMS MAINTAIN THERMAL ENVIRONMENT WITHIN REDLINES.
LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 788

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT GSE SERVICE PNL GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT GSE SERVICE PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43HR115, 129, 131, 133; 52V43HR116, 130, 132, 134

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF HTR MIGHT NOT BE DETECTABLE. WORST CASE WOULD BE LOSS OF ASSOCIATED GSE SERVICE PNL GROUP HTRS. THE REMAINING HTR SYSTEMS ARE CAPABLE OF MAINTAINING PROPER THERMAL ENVIRONMENT.
LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 789

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT GSE SERVICE PNL GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT GSE SERVICE PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43HR115, 129, 131, 133; 52V43HR116, 130, 132, 134

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN FAILED OFF CONDITION FOR GSE SEVICE PANEL HTR SYSTEM. THE GSE SERVICE PNL HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM. REMAINING HTR SYSTEMS MAINTAIN THERMAL ENVIRONMENT WITHIN REDLINES.
LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 790

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT LOWER INBD Y WEB GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT LOWER INBD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: LOWER Y-WEB, INBOARD
PART NUMBER: 51V43HR 57, 61, 73, 75, 77, 117, 127, 169, 171; 52V43HR 58, 62, 74, 76, 78, 118, 128, 170, 172

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF MISSION DUE TO INABLILITY TO MAINTAIN PROPER THERMAL ENVIRONMENT IN THE AREA OF THE OMS TANK ISOL VALVES AND XFEED LN'S.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 791

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT LOWER INBD Y WEB GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT LOWER INBD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: LOWER Y-WEB, INBOARD
PART NUMBER: 51V43HR 57, 61, 73, 75, 77, 117, 127, 169, 171; 52V43HR 58, 62, 74, 76, 78, 118, 128, 170, 172

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF MISSION DUE TO INABLILITY TO MAINTAIN PROPER THERMAL ENVIRONMENT IN THE AREA OF THE OMS TANK ISOL VALVES AND XFEED LN'S.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 792

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT LOWER INBD Y WEB GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT LOWER INBD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: LOWER Y-WEB, INBOARD
PART NUMBER: 51V43HR 57, 61, 73, 75, 77, 117, 127, 169, 171; 52V43HR 58, 62, 74, 76, 78, 118, 128, 170, 172

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF MISSION DUE TO INABLILITY TO MAINTAIN PROPER THERMAL ENVIRONMENT IN THE AREA OF THE OMS TANK ISOL VALVES AND XFEED LN'S.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 793

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT LOWER INBD Y WEB GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT LOWER INBD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: LOWER Y-WEB, INBOARD
PART NUMBER: 51V43HR 57, 61, 73, 75, 77, 117, 127, 169, 171; 52V43HR 58, 62, 74, 76, 78, 118, 128, 170, 172

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF MISSION DUE TO INABLILITY TO MAINTAIN PROPER THERMAL ENVIRONMENT IN THE AREA OF THE OMS TANK ISOL VALVES AND XFEED LN'S.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 794

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OME COMPT GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME COMPT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 79, 83; 52V43HR 80, 84

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 795 ABORT: 3/3

ITEM: HEATER, LT/RT OME COMPT GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME COMPT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 79, 83; 52V43HR 80, 84

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 796

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OME COMPT GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME COMPT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 79, 83; 52V43HR 80, 84

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 797 ABORT: 3/3

ITEM: HEATER, LT/RT OME COMPT GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME COMPT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 79, 83; 52V43HR 80, 84

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

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INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 798 ABORT: 3/3

ITEM: HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43HR 87, 89, 207, 209; 52V43HR 88, 90, 208, 210

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COVER HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 799

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43HR 87, 89, 207, 209; 52V43HR 88, 90, 208, 210

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COVER HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 800 ABORT: 3/3

ITEM: HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43HR 87, 89, 207, 209; 52V43HR 88, 90, 208, 210

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COVER HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 801

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OME OUTBOARD & INBOARD COVER GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43HR 87, 89, 207, 209; 52V43HR 88, 90, 208, 210

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COVER HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 802

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OMS ENG COMPT GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS ENG COMPT GROUP1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 81, 85; 52V43HR 82, 86

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 803

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OMS ENG COMPT GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS ENG COMPT GROUP1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 81, 85; 52V43HR 82, 86

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 804

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OMS ENG COMPT GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS ENG COMPT GROUP2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 81, 85; 52V43HR 82, 86

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 805

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OMS ENG COMPT GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS ENG COMPT GROUP2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43HR 81, 85; 52V43HR 82, 86

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 806

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OMS KEEL WEB GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43HR 17, 19, 21, 23, 25, 29, 31, 33, 37, 41, 43, 45, 47; 52V43HR 18, 20, 22, 24, 26, 30, 32, 34, 38, 42, 44, 46, 48

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMP. FAILURE OF ALL REDUNDANCY WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO. A FAILURE IN ANY ONE OF THE 47W HTR'S COULD GO UNDETECTED DURING FLIGHT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 807

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OMS KEEL WEB GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43HR 17, 19, 21, 23, 25, 29, 31, 33, 37, 41, 43, 45, 47; 52V43HR 18, 20, 22, 24, 26, 30, 32, 34, 38, 42, 44, 46, 48

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMP. FAILURE OF ALL REDUNDANCY WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO. OUT OF THE 14 HTR'S THERE ARE SIX IN WHICH A SHORT WOULD NOT BE DETECTED (HR19,21,25,29,41,47/HR20,22,26,30,42,48), BUT FAILURE OF ANY OF THE SIX WOULD NOT RESULT IN AN UNSAFE CONDITION.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 808 ABORT: 3/3

ITEM: HEATER, LT/RT OMS KEEL WEB GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43HR 17, 19, 21, 23, 25, 29, 31, 33, 37, 41, 43, 45, 47; 52V43HR 18, 20, 22, 24, 26, 30, 32, 34, 38, 42, 44, 46, 48

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMP. FAILURE OF ALL REDUNDANCY WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO. A FAILURE IN ANY ONE OF THE 47W HTR'S COULD GO UNDETECTED DURING FLIGHT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 809

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OMS KEEL WEB GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43HR 17, 19, 21, 23, 25, 29, 31, 33, 37, 41, 43, 45, 47; 52V43HR 18, 20, 22, 24, 26, 30, 32, 34, 38, 42, 44, 46, 48

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMP. FAILURE OF ALL REDUNDANCY WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO. OUT OF THE 14 HTR'S THERE ARE SIX IN WHICH A SHORT WOULD NOT BE DETECTED (HR19,21,25,29,41,47/HR20,22,26,30,42,48), BUT FAILURE OF ANY OF THE SIX WOULD NOT RESULT IN AN UNSAFE CONDITION.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 810

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: HEATER, LT/RT OMS TEST PORT GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS TEST PORT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OMS TEST PORT
PART NUMBER: 51V43HR 191; 52V43HR 192

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
EVEN WITH THE LOSS OF ALL REDUNDANCY ADEQUATE PROPELLANT TEMPERATURE WILL BE MAINTAINED.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 811

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: HEATER, LT/RT OMS TEST PORT GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS TEST PORT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OMS TEST PORT
PART NUMBER: 51V43HR 191; 52V43HR 192

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF HTR WILL DISABLE 2-47W KEEL WEB HTR'S REMAINING KEEL WEB HTR'S ARE CAPABLE OF MAINTAINING PROPER PROPELLANT TEMP.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 812

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: HEATER, LT/RT OMS TEST PORT GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS TEST PORT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OMS TEST PORT
PART NUMBER: 51V43HR 191; 52V43HR 192

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
EVEN WITH THE LOSS OF ALL REDUNDANCY ADEQUATE PROPELLANT TEMPERATURE WILL BE MAINTAINED.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 813

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: HEATER, LT/RT OMS TEST PORT GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OMS TEST PORT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OMS TEST PORT
PART NUMBER: 51V43HR 191; 52V43HR 192

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF HTR WILL DISABLE 2-47W KEEL WEB HTR'S REMAINING KEEL WEB HTR'S ARE CAPABLE OF MAINTAINING PROPER PROPELLANT TEMP.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 814

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: HEATER, LT/RT OX PRESS PNL GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OX PRESS PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OXIDIZER PRESS PANEL
PART NUMBER: 51V43HR 223, 225, 227; 52V43HR 224, 226, 228

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL OX PRESS PNL (FAILED OPEN) HTR'S WOULD RESULT IN A LONGER DUTY CYCLE FOR THE KEEL WEB HTR SYSTEM. POSSIBLY RESULTING IN HIGHER THAN DESIRED TEMPS IF NO ACTION TAKEN, THEREFORE CREW MIGHT BE REQUIRED TO CYCLE HTR SYSTEM.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 815

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OX PRESS PNL GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OX PRESS PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: OXIDIZER PRESS PANEL
PART NUMBER: 51V43HR 223, 225, 227; 52V43HR 224, 226, 228

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD RESULT IN FAILURE OF THE KEEL WEB HTR SYSTEM (THESE HTRS ARE PART OF THE KEEL WEB SYSTEM AND A FAIL SHORT FOR ALL WOULD FAIL SIX/GROUP OF THE KEEL WEB HTRS) AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 816

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: HEATER, LT/RT OX PRESS PNL GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OX PRESS PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OXIDIZER PRESS PANEL
PART NUMBER: 51V43HR 223, 225, 227; 52V43HR 224, 226, 228

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL OX PRESS PNL (FAILED OPEN) HTR'S WOULD RESULT IN A LONGER DUTY CYCLE FOR THE KEEL WEB HTR SYSTEM. POSSIBLY RESULTING IN HIGHER THAN DESIRED TEMPS IF NO ACTION TAKEN, THEREFORE CREW MIGHT BE REQUIRED TO CYCLE HTR SYSTEM.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 817

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT OX PRESS PNL GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT OX PRESS PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: OXIDIZER PRESS PANEL
PART NUMBER: 51V43HR 223, 225, 227; 52V43HR 224, 226, 228

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD RESULT IN FAILURE OF THE KEEL WEB HTR SYSTEM (THESE HTRS ARE PART OF THE KEEL WEB SYSTEM AND A FAIL SHORT FOR ALL WOULD FAIL SIX/GROUP OF THE KEEL WEB HTRS) AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 818 ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V42HR215, 217, 219, 221; 52V42HR216, 218, 220, 222

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 819

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V42HR215, 217, 219, 221; 52V42HR216, 218, 220, 222

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 820

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V42HR215, 217, 219, 221; 52V42HR216, 218, 220, 222

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 821 ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V42HR215, 217, 219, 221; 52V42HR216, 218, 220, 222

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 822 ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH DN GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH DN GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 159. 161, 163, 165, 167, 155, 157; 52V43HR 160. 162, 164, 166, 164, 156, 158

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 823

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH DN GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH DN GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 159. 161, 163, 165, 167, 155, 157; 52V43HR 160. 162, 164, 166, 164, 156, 158

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 824

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH DN GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH DN GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 159. 161, 163, 165, 167, 155, 157; 52V43HR 160. 162, 164, 166, 164, 156, 158

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 825

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH DN GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH DN GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 159. 161, 163, 165, 167, 155, 157; 52V43HR 160. 162, 164, 166, 164, 156, 158

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 826

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH UP GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH UP GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 91, 93, 95, 97, 99, 103; 52V43HR 92, 94, 96, 98, 100, 104

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 827

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH UP GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH UP GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 91, 93, 95, 97, 99, 103; 52V43HR 92, 94, 96, 98, 100, 104

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 828

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH UP GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH UP GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 91, 93, 95, 97, 99, 103; 52V43HR 92, 94, 96, 98, 100, 104

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 829

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING PITCH UP GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING PITCH UP GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 91, 93, 95, 97, 99, 103; 52V43HR 92, 94, 96, 98, 100, 104

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 830

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING VERNIER GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING VERNIER GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 149, 151, 153; 52V43HR 150, 152, 154

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 831 ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING VERNIER GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING VERNIER GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 149, 151, 153; 52V43HR 150, 152, 154

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 832 ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING VERNIER GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING VERNIER GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 149, 151, 153; 52V43HR 150, 152, 154

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 833

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING VERNIER GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING VERNIER GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 149, 151, 153; 52V43HR 150, 152, 154

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 834

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING YAW GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING YAW GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 105, 107, 109, 113, 141, 145, 143, 211, 213; 52V43HR 106, 108, 110, 114, 142, 146, 144, 212, 214

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 835

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING YAW GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING YAW GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 105, 107, 109, 113, 141, 145, 143, 211, 213; 52V43HR 106, 108, 110, 114, 142, 146, 144, 212, 214

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 836

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING YAW GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING YAW GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 105, 107, 109, 113, 141, 145, 143, 211, 213; 52V43HR 106, 108, 110, 114, 142, 146, 144, 212, 214

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 837

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT RCS HOUSING YAW GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT RCS HOUSING YAW GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43HR 105, 107, 109, 113, 141, 145, 143, 211, 213; 52V43HR 106, 108, 110, 114, 142, 146, 144, 212, 214

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 838

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER INBOARD Y WEB GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER INBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, INBOARD
PART NUMBER: 51V43HR 59, 63, 65, 67; 52V43HR 60, 64, 66, 68

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER INBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 839

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER INBOARD Y WEB GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER INBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, INBOARD
PART NUMBER: 51V43HR 59, 63, 65, 67; 52V43HR 60, 64, 66, 68

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER INBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 840

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER INBOARD Y WEB GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER INBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, INBOARD
PART NUMBER: 51V43HR 59, 63, 65, 67; 52V43HR 60, 64, 66, 68

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER INBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 841

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER INBOARD Y WEB GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER INBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, INBOARD
PART NUMBER: 51V43HR 59, 63, 65, 67; 52V43HR 60, 64, 66, 68

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER INBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 842

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 1
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, OUTBOARD
PART NUMBER: 51V43HR 49, 51, 53, 55; 52V43HR 50, 52, 54, 56

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER OUTBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 843

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 1
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, OUTBOARD
PART NUMBER: 51V43HR 49, 51, 53, 55; 52V43HR 50, 52, 54, 56

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER OUTBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 844

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 2
FAILURE MODE: FAILS OPEN, FAILS TO PROVIDE HEAT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, OUTBOARD
PART NUMBER: 51V43HR 49, 51, 53, 55; 52V43HR 50, 52, 54, 56

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER OUTBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 845

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 2
FAILURE MODE: FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) HEATER, LT/RT UPPER OUTBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER Y-WEB, OUTBOARD
PART NUMBER: 51V43HR 49, 51, 53, 55; 52V43HR 50, 52, 54, 56

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER OUTBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 846

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS HIGH (ENERGIZED POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131K3; 55V76A132K5

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER TO FROM PART OF GROUP 1 HTR SYSTEM. NO EFFECT UNLESS A SECOND FAILURE IN THE SAME HTR GROUP WHICH WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 847 ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131K3; 55V76A132K5

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GROUP 1 HTR'S, GROUP 2 STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY (2ND FAILURE) RESULTS IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 848 ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131K4; 55V76A132K6

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER TO FROM PART OF GROUP 1 HTR SYSTEM. NO EFFECT UNLESS A SECOND FAILURE IN THE SAME HTR GROUP WHICH WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 849

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131K4; 55V76A132K6

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GROUP 1 HTR'S, GROUP 2 STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY (2ND FAILURE) RESULTS IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 850

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS HIGH (FAILS ENERGIZED)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3, AV BAY 4, PCA 1
PART NUMBER: 56V76A133K5; 54V76A131K5

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER TO FROM PART OF GROUP 1 HTR SYSTEM. NO EFFECT UNLESS A SECOND FAILURE IN THE SAME HTR GROUP WHICH WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 851

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3, AV BAY 4, PCA 1
PART NUMBER: 56V76A133K5; 54V76A131K5

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GROUP 2 HTR'S, GROUP 1 STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 852 ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2, AV BAY 6, PCA 3
PART NUMBER: 55V76A132K4; 56V76A133K3

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER TO FROM PART OF GROUP 1 HTR SYSTEM. NO EFFECT UNLESS A SECOND FAILURE IN THE SAME HTR GROUP WHICH WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 853

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RELAY, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2, AV BAY 6, PCA 3
PART NUMBER: 55V76A132K4; 56V76A133K3

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GROUP 2 HTR'S, GROUP 1 STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 854

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J4-8A; 55V76A122R J3-127A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 855

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J4-8B; 55V76A122R J3-127B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 856

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J4-8A; 55V76A122R J3-127A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 857

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J4-8B; 55V76A122R J3-127B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 858

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J8-118A; 55V76A122R J3-101A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 859

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J8-118B; 55V76A122R J3-101B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 860

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J8-118A; 55V76A122R J3-101A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

| | | | |
|---|---|---|---|
| DATE: | 1/16/87 | HIGHEST CRITICALITY | HDW/FUNC |
| SUBSYSTEM: | OMS | FLIGHT: | 3/3 |
| MDAC ID: | 861 | ABORT: | 3/3 |

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J8-118B; 55V76A122R J3-101B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 862 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122R J4-8A; 56V76A123R J4-8A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 863

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122R J4-8B; 56V76A123R J4-8B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 864

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122R J4-8A; 56V76A123R J4-8A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 865 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2; AV BAY 6, LCA 3
PART NUMBER: 55V76A122R J4-8B; 56V76A123R J4-8B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 866 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-101A; 54V76A121R J3-101A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 867

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-113B; 54V76A121R J3-113B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPELLANTS AT DESIRED TEMPERATURES AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 868

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-101A; 54V76A121R J3-101A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 869 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT KEEL WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-113B; 54V76A121R J3-113B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, KEEL WEB HTR SYSTEM STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 870 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J3-127A; 55V76A122R J3-113A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE DOES NOT RESULT IN LOSS OF ANY HTR GROUP. SECOND FAILURE RESULTS IN LOSS OF GROUP 1 HTRS, GROUP 2 STILL FULLY OPERATIONAL.
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 871

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J3-127A; 55V76A122R J3-113A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ISOLATION RESISTANCE, ALL HTR GROUPS STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 872

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J3-127B; 55V76A122R J3-113B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE DOES NOT RESULT IN LOSS OF ANY HTR GROUP. SECOND FAILURE RESULTS IN LOSS OF GROUP 1 HTRS, GROUP 2 STILL FULLY OPERATIONAL.
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 873

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A121R J3-127B; 55V76A122R J3-112B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ISOLATION RESISTANCE, ALL HTR GROUPS STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 874

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-113A; 54V76A121R J3-113A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE DOES NOT RESULT IN LOSS OF ANY HTR GROUP. SECOND FAILURE RESULTS IN LOSS OF GROUP 2 HTRS, GROUP 1 STILL FULLY OPERATIONAL.
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 875

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-113B; 54V76A121R J3-113B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE DOES NOT RESULT IN LOSS OF ANY HTR GROUP. SECOND FAILURE RESULTS IN LOSS OF GROUP 2 HTRS, GROUP 1 STILL FULLY OPERATIONAL.
LOSS OF ALL REDUNDANCY WOULD RESULT IN INABILITY TO MAINTAIN PROPER THERMAL CONTROL IN THE RCS HOUSING AND WOULD BE CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 876

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-113A; 54V76A121R J3-113A

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ISOLATION RESISTANCE, ALL HTR GROUPS STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 877 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3; AV BAY 4, LCA 1
PART NUMBER: 56V76A123R J3-113B; 54V76A121R J3-113B

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSS OF ISOLATION RESISTANCE, ALL HTR GROUPS STILL OPERATIONAL.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 878 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131A1R35; 55V76A132A1R6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE SWITCH TALKBACK, SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING GROUP 1 HTR OPERATION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 879 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W, LT/RT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1; AV BAY 5, PCA 2
PART NUMBER: 54V76A131A1R35; 55V76A132A1R6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 880 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3; AV BAY 4, PCA 1
PART NUMBER: 56V76A133A1R10; 54V76A131A1R39

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE SWITCH TALKBACK, SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING GROUP 2 HTR OPERATION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: OMS
MDAC ID: 881

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W, LT/RT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3; AV BAY 4, PCA 1
PART NUMBER: 56V76A133A1R10; 54V76A131A1R39

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 882

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, COVER THERMO. TEMP
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, COVER THERMO. TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OME COVER
PART NUMBER: 51V43TT419, 52V43TT519

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE DIRECT TEMP MEASUREMENT FOR OME COVER HTR SYSTEM. ALTHOUGH VALIDITY OF THE MEASUREMENT (SENSOR FAILURE) MIGHT NOT BE IMMEDIATELY DETERMINED A THERMOSTAT FAILURE "OFF" IS CONSIDERED FAIL OPERATIONAL FOR THE SYSTEM AND A THERMOSTAT FAILURE "ON" CAN BE DETERMINED BY MONITORING THE OX ENG INLET TEMP MEASUREMENT V43T4216A/V43T5216A.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 883 ABORT: 3/3

ITEM: SENSOR TEMPERATURE, ENG SERVICE PNL
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, ENG SERVICE PNL
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: ENGINE SERVICE PANEL
PART NUMBER: 51V43TT412, 52V43TT512

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE DIRECT TEMP MEASUREMENT FOR THE OME SERVICE PANEL HTR SYSTEM. ALTHOUGH VALIDITY OF MEASUREMENT (SENSOR FAILURE) MIGHT NOT BE IMMEDIATELY DETERMINED A THERMOSTAT FAILURE "OFF" IS CONSIDERED FAIL OPERATIONAL AND A THERMOSTAT FAILURE "ON" CAN BE DETERMINED BY MONITORING FU FEED LN TEMP V43T4642A/V43T5642A AND OX INLET TEMP V43T4216A/V43T5216A.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV 3; JSC 18549, 82OCT, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 884 ABORT: 3/3

ITEM: SENSOR TEMPERATURE, GSE SERVICE PNL
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, GSE SERVICE PNL
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43TT411, 51V43TT511

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE DIRECT TEMP MEASUREMENT FOR THE GSE SER PNL HTR SYSTEM. ALTHOUGH VALIDITY OF MEASUREMENT MIGHT NOT BE IMMEDIATELY DETERMINED, A THERMOSTAT FAILURE, EITHER "ON" OR "OFF" RESULTS IN A FAIL OPERATIONAL CONDITION FOR THIS HTR SYSTEM.

REFERENCES: VS70-943099 REV A EO B12; 73B760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 885

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, LEFT/RIGHT SKIN TEMP 38
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, LEFT/RIGHT SKIN TEMP 38
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: POD SKIN
PART NUMBER: 51V09TT420, 52V09TT520

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
51V09TT420 & 52V09TT520 IS PART OF THE MADS SYSTEM AND THEREFORE NOT A PART OF THIS ANALYSIS (NOT USED DURING ANY FLIGHT PHASE).

REFERENCES: VS70-943099 REV A EO B12; 73B760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 886 ABORT: 3/3

ITEM: SENSOR TEMPERATURE, OMS ENG COMPT B.H.S. (POD BASE)
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, OMS ENG COMPT B.H.S. (POD BASE)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: ENGINE COMPARTMENT, (B.H.S. POD BASE)
PART NUMBER: 51V43MTT418, 52V43TT518

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, PROVIDES A NONCRITICAL MEASUREMENT

REFERENCES: VS70-943099 REV A EO B12; 73B760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 887

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, OX DRAIN PNL TEMP 1 & TEMP 2
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, OX DRAIN PNL TEMP 1 & TEMP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: OXIDIZER DRAIN PANEL
PART NUMBER: 51V43TT409, 51V43TT410, 52V43TT509, 52V43TT510

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE. SENSOR FAILURE CAN BE DETERMINED BY MONITORING REDUNDANT MEASUREMENT. LOSS OF ALL REDUNDANCY COULD LEAD TO INCORRECTLY FAILING THE INBOARD Y-WEB HTR SYSTEM AND SWITCHING TO REDUNDANT HTR GROUP BEFORE SENSOR FAILURE IS DETERMINED.

REFERENCES: VS70-943099 REV A EO B12; 73B760210 REV 3; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 888

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, RCS HSG VERNIER COMP TEMP 2
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, RCS HSG VERNIER COMP TEMP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: RCS HSG VERNIER THRUSTER PNL
PART NUMBER: 51V43TT402, 52V43TT502

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, FAILURE CAN BE DETERMINED FIRST BY MONITORING REDUNDANT MEASUREMENT V43T4701A(51V43TT414)/V43T5701A(52V43TT514) AND SECOND BY MONITORING THE RATE AT WHICH THE SENSOR MEASUREMENT CHANGED. FOR LOSS OF ALL REDUNDANCY WORST CASE WOULD BE SWITCHING TO REDUNDANT HTR SYSTEM BEFORE SENSOR FAILURE COULD BE DETERMINED.

REFERENCES: VS70-943009 REV A EO B12; 73A760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 889 ABORT: 3/3

ITEM: SENSOR TEMPERATURE, RCS HSG VERNIER COMPT TEMP 1
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, RCS HSG VERNIER COMPT TEMP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: RCS HSG VERNIER THRUSTER PNL
PART NUMBER: 51V43TT414, 52V43TT514

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, FAILURE CAN BE DETERMINED FIRST BY MONITORING REDUNDANT MEASUREMENT V43T4711A(51V43TT402)/V43T5711A(52V43TT502) AND SECOND BY MONITORING THE RATE AT WHICH THE SENSOR MEASUREMENT CHANGED. FOR LOSS OF ALL REDUNDANCY WORST CASE WOULD BE SWITCHING TO REDUNDANT HTR SYSTEM BEFORE SENSOR FAILURE COULD BE DETERMINED.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 890 ABORT: 3/3

ITEM: SENSOR TEMPERATURE, RCS PRESS PNL SPRT TEMP 1
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, RCS PRESS PNL SPRT TEMP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: RCS OX PRESS PNL
PART NUMBER: 51V43TT413, 52V43TT513

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, FAILURE CAN BE DETERMINED FIRST BY MONITORING REDUNDANT MEASUREMENT V43T4710A (51V43TT4103)/V43T5710A(52V43TT5103) AND SECOND BY MONITORING THE RATE AT WHICH THE SENSOR MEASUREMENT CHANGED. FOR LOSS OF ALL REDUNDANCY THE STATUS OF THE KEEL WEB HTR SYSTEM OPERATION CAN BE INDIRECTLY DETERMINED BY MONITORING PROPELLANT TEMPERATURES.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV 3; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 891

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, RCS PRESS PNL SPRT TEMP 2
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, RCS PRESS PNL SPRT TEMP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: RCS OX PRESS PNL
PART NUMBER: 51V43TT403, 52V43TT503

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, FAILURE CAN BE DETERMINED FIRST BY MONITORING REDUNDANT MEASUREMENT V43T4700A (51V43TT413)/V43T5700A(52V43TT513) AND SECOND BY MONITORING THE RATE AT WHICH THE SENSOR MEASUREMENT CHANGED. FOR LOSS OF ALL REDUNDANCY THE STATUS OF THE KEEL WEB HTR SYSTEM OPERATION CAN BE INDIRECTLY DETERMINED BY MONITORING PROPELLANT TEMPERATURES.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549,82OCT,LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 892

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, UPPER Y-WEB INBD
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, UPPER Y-WEB INBD
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: UPPER Y-WEB, INBOARD
PART NUMBER: 51V43TT416, 52V43TT516

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE. LOSE DIRECT TEMP MEASUREMENT FOR THE INBD Y-WEB HTR SYSTEM. ALTHOUGH VALIDITY OF THE MEASUREMENT (SENSOR FAILURE) MIGHT NOT BE IMMEDIATELY DETERMINED A THERMOSTAT FAILURE "OFF" IS CONSIDERED FAIL OPERATIONAL AND A THERMOSTAT FAILED "ON" CAN BE DETERMINED BY MONITORING THE UPPER OUTBD Y-WEB TEMP V43T4702A/V43T5702A.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86
SUBSYSTEM: OMS
MDAC ID: 893

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: SENSOR TEMPERATURE, UPPER Y-WEB OUTBD
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SENSOR TEMPERATURE, UPPER Y-WEB OUTBD
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: UPPER Y-WEB, OUTBOARD
PART NUMBER: 51V43TT415, 51V43TT515

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NONE, LOSE DIRECT TEMP MEASUREMENT FOR THE OUTBD Y-WEB HTR SYSTEM. ALTHOUGH VALIDITY OF THE MEASUREMENT (SENSOR FAILURE) MIGHT NOT BE IMMEDIATELY DETERMINED A THERMOSTAT FAILURE "OFF" IS CONSIDERED FAIL OPERATIONAL AND A THERMOSTAT FAILURE "ON" CAN BE DETERMINED BY MONITORING THE UPPER INBD Y-WEB TEMP V43T4703A/V43T5703A.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, 82OCT, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 894 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43S43; 52V43S44

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN FAILED OFF CONDITION FOR GSE SEVICE PANEL HTR SYSTEM. THE GSE SERVICE PNL HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM. REMAINING HTR SYSTEMS MAINTAIN THERMAL ENVIRONMENT WITHIN REDLINES.
LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 895

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43S43; 52V43S44

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 896 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43S51; 52V43S52

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN FAILED OFF CONDITION FOR GSE SEVICE PANEL HTR SYSTEM. THE GSE SERVICE PNL HTR SYSTEM IS NOT A CRITICAL HTR SYSTEM. REMAINING HTR SYSTEMS MAINTAIN THERMAL ENVIRONMENT WITHIN REDLINES.
LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 897

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: GSE SERVICE PANEL
PART NUMBER: 51V43S51; 52V43S52

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 898 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43S21; 52V43S22

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF ALL REDUNDANCY RESULTS IN FAILURE OF THE KEEL WEB HTR SYSTEM AND IS CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO IF THE ENVIRONMENT CANNOT MAINTAIN THERMAL REDLINES.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 899

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43S21; 52V43S22

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 900

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43S23; 52V43S24

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FAILURE OF ALL REDUNDANCY RESULTS IN FAILURE OF THE KEEL WEB HTR SYSTEM AND IS CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO IF THE ENVIRONMENT CANNOT MAINTAIN THERMAL REDLINES.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 901

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: KEEL WEB
PART NUMBER: 51V43S23; 52V43S24

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 902

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: LOWER INBOARD Y-WEB
PART NUMBER: 51V43S33; 52V43S34

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF LOWER INBOARD Y-WEB HTR SYSTEM. RE-ENTRY COULD BE REQUIRED IF THERMAL LIMITS CANNOT BE MAINTAINED.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 903

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: LOWER INBOARD Y-WEB
PART NUMBER: 51V43S33; 52V43S34

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 904

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: LOWER INBOARD Y-WEB
PART NUMBER: 51V43S35; 52V43S36

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF LOWER INBOARD Y-WEB HTR SYSTEM. RE-ENTRY COULD BE REQUIRED IF THERMAL LIMITS CANNOT BE MAINTAINED.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 905

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: LOWER INBOARD Y-WEB
PART NUMBER: 51V43S35; 52V43S36

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 906

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COMPT GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COMPT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43S37; 51V43S38

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 907

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COMPT GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COMPT GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43S37; 51V43S38

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 908 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COMPT GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COMPT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43S39; 51V43S40

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COMPARTMENT HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 909

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COMPT GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COMPT GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COMPARTMENT
PART NUMBER: 51V43S39; 51V43S40

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 910

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COVER GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COVER GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43S53; 51V43S54

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COVER HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 911 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COVER GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COVER GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43S53; 51V43S54

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 912 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COVER GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COVER GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43S55; 51V43S56

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE OME COVER HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 913

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT OME COVER GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT OME COVER GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: OME COVER
PART NUMBER: 51V43S55; 51V43S56

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 914

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT RCS HOUSING GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43S47, 51V42S41; 52V43S47, 52V42S41

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILURE OF ALL REDUNDANCY RESULTS IN FAILURE OF THE RCS HOUSING HTR SYSTEM AND IS CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO IF THE ENVIRONMENT EXCEEDS THERMAL REDLINES.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 915

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT RCS HOUSING GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT RCS HOUSING GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43S47, 51V42S41; 52V43S47, 52V42S41

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 916

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT RCS HOUSING GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43S45, 51V42S49; 52V43S45, 52V42S49

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
A FAILURE OF ALL REDUNDANCY RESULTS IN FAILURE OF THE RCS HOUSING HTR SYSTEM AND IS CAUSE FOR ENTRY ON NEXT DAILY GO/NO-GO IF THE ENVIRONMENT EXCEEDS THERMAL REDLINES.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 917

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT RCS HOUSING GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT RCS HOUSING GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: RCS HOUSING
PART NUMBER: 51V43S45, 51V42S49; 52V43S45, 52V42S49

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 918

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER INBOARD Y WEB
PART NUMBER: 51V43S31; 51V43S32

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER INBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 919

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER INBOARD Y WEB
PART NUMBER: 51V43S31; 51V43S32

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 920

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER INBOARD Y WEB
PART NUMBER: 51V43S29; 51V43S30

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER INBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 921 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER INBOARD Y WEB
PART NUMBER: 51V43S29; 51V43S30

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 922 ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 1
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER OUTBOARD Y-WEB
PART NUMBER: 51V43S27; 51V43S28

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER OUTBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 923

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 1
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER OUTBOARD Y-WEB
PART NUMBER: 51V43S27; 51V43S28

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 924

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 2
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER OUTBOARD Y-WEB
PART NUMBER: 51V43S25; 51V43S26

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
RESULTS IN A POSSIBLE FAILED OFF CONDITION FOR THE UPPER OUTBOARD Y-WEB HTR SYSTEM. REDUNDANT HTR GROUP AVAILABLE, BUT LOSS OF ALL REDUNDANCY RESULTS IN LOSS OF MISSION DUE TO AN INABILITY TO MAINTAIN PROPER POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/19/87
SUBSYSTEM: OMS
MDAC ID: 925

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 2
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V. J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: UPPER OUTBOARD Y-WEB
PART NUMBER: 51V43S25; 51V43S26

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN THE ASSOCIATED HTR SET BEING FAILED "ON" WHICH COULD RESULT IN A HIGHER THAN DESIRED TEMP IN POD. A SECOND FAILURE IN THE SAME HTR GROUP WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS.

REFERENCES: VS70-943099 REV A EO B12; 73A760210 REV E; JSC 18549, OCT 82, LTR JUNE 85; JSC 20923 PCN-1; MDAC-STL MEMO NO. 598-E242-808 23FEB78

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/1R
MDAC ID: 926 ABORT: 3/3

ITEM: SWITCH, TOGGLE RCS/OMS HEATER LT/RT POD GROUP1
FAILURE MODE: FAILS TO SWITCH (STUCK IN ON POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, RCS/OMS HEATER LT/RT POD GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S1 ; 36V73A14-S4

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER TO PART OF GROUP 1 HTR SYSTEM. NO EFFECT UNLESS A SECOND FAILURE IN THE SAME HTR GROUP WHICH WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87
SUBSYSTEM: OMS
MDAC ID: 927

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: SWITCH, TOGGLE RCS/OMS HEATER LT/RT POD GROUP 2
FAILURE MODE: FAILS TO SWITCH (STUCK IN ON POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, RCS/OMS HEATER LT/RT POD GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/1R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S2 ; 36V73A14-S5

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO REMOVE POWER TO PART OF GROUP 1 HTR SYSTEM. NO EFFECT UNLESS A SECOND FAILURE IN THE SAME HTR GROUP WHICH WOULD RESULT IN BOTH ELEMENTS OF TWO OR MORE HTR'S "ON" SIMULTANEOUSLY WHEN THE REDUNDANT HTR GROUP IS ACTIVE RESULTING IN A TEMPERATURE EXCEEDING THE POD STRUCTURAL QUALIFIED LIMIT OF 425 F AND POSSIBLE LOSS OF VEHICLE/LIFE DUE TO STRUCTURAL DAMAGE. TESTS HAVE SHOWN THAT A 4" BY 8" 47W HTR WITH BOTH ELEMENTS ON WILL HAVE A MAX TEMP OF 552 F AND A 1" BY 7" 10W HTR WILL HAVE A MAX TEMP OF 615 F UNDER SAME CONDITIONS

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87
SUBSYSTEM: OMS
MDAC ID: 928

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH, TOGGLE, RCS/OMS HEATER LT/RT POD GROUP 1
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE OFF POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, RCS/OMS HEATER LT/RT POD GROUP 1
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S1 ; 36V73A14-S4

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GROUP 1 HTR'S, GROUP 2 STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY (2ND FAILURE) RESULTS IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87
SUBSYSTEM: OMS
MDAC ID: 929

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH, TOGGLE, RCS/OMS HEATER LT/RT POD GROUP 2
FAILURE MODE: FAILS TO SWITCH (STUCK IN THE OFF POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) POD
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, RCS/OMS HEATER LT/RT POD GROUP 2
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S2 ; 36V73A14-S5

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
FIRST FAILURE RESULTS IN LOSS OF GROUP 1 HTR'S, GROUP 2 STILL FULLY OPERATIONAL. LOSS OF ALL REDUNDANCY (2ND FAILURE) RESULTS IN LOSS OF MISSION DUE TO INABILITY TO MAINTAIN POD THERMAL ENVIRONMENT.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1; 73A760210 REV A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 930

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J6-PP TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 931

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J6-PP TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO UTILIZE THE CONTROL TEMP THERMOSTAT. THE OVER TEMP THERMOSTAT STILL AVAILABLE TO MAINTAIN SAFE HTR OPERATION.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 932

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J6-MM TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 933

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J6-MM TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO UTILIZE THE CONTROL TEMP THERMOSTAT. THE OVER TEMP THERMOSTAT STILL AVAILABLE TO MAINTAIN SAFE HTR OPERATION.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 934

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J6-NN TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 935

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121AR J6-NN TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO UTILIZE THE CONTROL TEMP THERMOSTAT. THE OVER TEMP THERMOSTAT STILL AVAILABLE TO MAINTAIN SAFE HTR OPERATION.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 936

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122AR J6-PP TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 937

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122AR J6-PP TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO UTILIZE THE CONTROL TEMP THERMOSTAT. THE OVER TEMP THERMOSTAT STILL AVAILABLE TO MAINTAIN SAFE HTR OPERATION.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 938

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122AR J6-H' TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 939

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122AR J6-H' TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO UTILIZE THE CONTROL TEMP THERMOSTAT. THE OVERTEMP THERMOSTAT STILL AVAILABLE TO MAINTAIN SAFE HTR OPERATION.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 940

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122AR J6-EE TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 941

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) DRIVER, HYBRID
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122AR J6-EE TYPE III

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO UTILIZE THE CONTROL TEMP THERMOSTAT. THE OVERTEMP THERMOSTAT STILL AVAILABLE TO MAINTAIN SAFE HTR OPERATION.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 942

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2
PART NUMBER: 55V76A132F28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 943

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2
PART NUMBER: 55V76A132F23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 944

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131F25

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NO EFFECT, PBK CIRCUITRY NOT USED SINCE PBK DOES NOT EXIST.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 945

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131F26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 946

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131F30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 947

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUSE, 10A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 10A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2
PART NUMBER: 55V76A132F22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NOT ENOUGH INFORMATION ON PBK CIRCUITRY.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 948

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 1A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14, S8
PART NUMBER: 36V73A14F26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 949

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 1A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 1A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14, S7
PART NUMBER: 36V73A14F25

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 950

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131F24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 951

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUSE, 20A
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUSE, 20A
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A132F21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 952 ABORT: 3/3

ITEM: FUEL AND OXIDIZER LOWER CENTER FEED LINE (XFEED) HEATER ELEMENT (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER CENTER FEED LINE (XFEED) HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1051; HR1052; HR1053; HR1054

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 953 ABORT: 3/3

ITEM: FUEL AND OXIDIZER LOWER CENTER FEED LINE (XFEED) HEATER ELEMENT (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER CENTER FEED LINE (XFEED) HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1051; HR1052; HR1053; HR1054

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 954 ABORT: 3/3

ITEM: FUEL AND OXIDIZER LOWER LEFT FEED LINE (XFEED) HEATER ELEMENT (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER LEFT FEED LINE (XFEED) HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1031; HR1032; HR1033; HR1034

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 955 ABORT: 3/3

ITEM: FUEL AND OXIDIZER LOWER LEFT FEED LINE (XFEED) HEATER ELEMENT (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER LEFT FEED LINE (XFEED) HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1031; HR1032; HR1033; HR1034

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 956 ABORT: 3/3

ITEM: FUEL AND OXIDIZER LOWER RIGHT FEED LINE (XFEED) HEATER ELEMENT (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER RIGHT FEED LINE (XFEED) HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1041; HR1042; HR1043; HR1044

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 957 ABORT: 3/3

ITEM: FUEL AND OXIDIZER LOWER RIGHT FEED LINE (XFEED) HEATER ELEMENT (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER RIGHT FEED LINE (XFEED) HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1041; HR1042; HR1043; HR1044

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 958

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE HEATER ELEMENT (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1100

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 959

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE HEATER ELEMENT (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1100

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 960

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE T-4 UMB HEATER (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE T-4 UMB HEATER (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43HR1120; HR1122

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 961

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE T-4 UMB HEATER (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE T-4 UMB HEATER (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43HR1120; HR1122

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 962

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: L FUEL AND OXIDIZER LO PT DRAIN LINE HEATER ELEMENT (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) L FUEL AND OXIDIZER LO PT DRAIN LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1141; HR1142

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 963

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: L FUEL AND OXIDIZER LO PT DRAIN LINE HEATER
ELEMENT (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) L FUEL AND OXIDIZER LO PT DRAIN LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1141; HR1142

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 964

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: LEFT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) LEFT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1011; HR1012

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 965

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: LEFT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) LEFT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1011; HR1012

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 966

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE HEATER ELEMENT (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1110

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 967 ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE HEATER ELEMENT (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1110

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 968 ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE T-4 UMB HEATER (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE T-4 UMB HEATER (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43HR1130; HR1132

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 969

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE T-4 UMB HEATER (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE T-4 UMB HEATER (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43HR1130; HR1132

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 970 ABORT: 3/3

ITEM: R FUEL AND OXIDIZER LO PT DRAIN LINE HEATER ELEMENT (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) R FUEL AND OXIDIZER LO PT DRAIN LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1151; HR1152

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 971 ABORT: 3/3

ITEM: R FUEL AND OXIDIZER LO PT DRAIN LINE HEATER ELEMENT (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) R FUEL AND OXIDIZER LO PT DRAIN LINE HEATER ELEMENT (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1151; HR1152

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 972 ABORT: 3/3

ITEM: RIGHT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RIGHT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ F ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1021; HR1022

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 973 ABORT: 3/3

ITEM: RIGHT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RIGHT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43HR1021; HR1022

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN.
LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 974

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RELAY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2
PART NUMBER: 55V76A132K3

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO TURN OFF "B" XFEED HTR SYSTEM. CONTROL THERMOSTATS WILL MAINTAIN PROPER THERMAL ENVIROMINT. SECOND FAILURE IN REDUNDANT SYSTEM RESULTS IN BOTH "A" & "B" XFEED HTR SYSTEMS STUCK IN AUTO MODE.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 975

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RELAY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, PCA 2
PART NUMBER: 55V76A132K3

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 976

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS HIGH

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RELAY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ F ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131K2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO TURN OFF "A" XFEED HTR SYSTEM. CONTROL THERMOSTATS WILL MAINTAIN PROPER THERMAL ENVIROMINT. SECOND FAILURE IN REDUNDANT SYSTEM RESULTS IN BOTH "A" & "B" XFEED HTR SYSTEMS STUCK IN AUTO MODE.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 977

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RELAY
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RELAY
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131K2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 978

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J8-38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, XFEED THERMAL CONTROL STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 979

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J8-38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 980

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J8-35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 981

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, LCA 1
PART NUMBER: 54V76A121 J8-35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, XFEED THERMAL CONTROL STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 982

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122 J8-38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, XFEED THERMAL CONTROL STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 983

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122 J8-38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 984 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122 J8-35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 985

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 1.2K 2W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, LCA 2
PART NUMBER: 55V76A122 J8-35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE, XFEED THERMAL CONTROL STILL AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 986

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2
PART NUMBER: 55V76A132A1R18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE SWITCH TALKBACK. SWITCH POSITION CAN BE DETERMINED BY MONITORING HTR OPERATION WITH REDUNDANT SYSTEM TURNED OFF.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 987

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2
PART NUMBER: 55V76A132A1R18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 988

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A1R16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
LOSE SWITCH TALKBACK. SWITCH POSITION CAN BE DETERMINED BY MONITORING HTR OPERATION WITH REDUNDANT SYSTEM TURNED OFF.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 989

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RESISTOR, 5.1K 1/4W
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1
PART NUMBER: 54V76A131A1R16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:
NONE SWITCH TALKBACK STILL AVAILABLE TO GPC.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 990 ABORT: 3/3

ITEM: AFT FUSLG FUEL HI PT BLEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) AFT FUSLG FUEL HI PT BLEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT11

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 991

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: AFT FUSLG OXIDIZER HI PT BLEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) AFT FUSLG OXIDIZER HI PT BLEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT12

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 992

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: BHD FUEL HI PT BLEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) BHD FUEL HI PT BLEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43MT7

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 993

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: BHD OXIDIZER HI PT BLEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) BHD OXIDIZER HI PT BLEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43MT8

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 994

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 3/3

ITEM: CENTER - AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) CENTER AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT14

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: WORST CASE WOULD BE A FALSE INDICATION OF HTR SYSTEM FAILED "OFF" ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 995

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: LEFT AFT FUEL XFEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) LEFT AFT FUEL XFEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT13

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NO EFFECT. NOT FOUND IN SSSH, HTR SYSTEMS BOOK JSC-18549, OR MML. ASSUMED ERROR IN VS70-943099 DWG.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 996

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: LEFT AFT FUSLG LOW PT OXIDIZER DRAIN LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) LEFT AFT FUSLG LOW PT OXIDIZER DRAIN LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT9

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 997

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 3/3

ITEM: LEFT - AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) LEFT AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS) EFFECT: WORST CASE WOULD BE A FALSE INDICATION OF HTR SYSTEM FAILED "OFF" ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 998

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 3/3

ITEM: LEFT AFT OXIDIZER XFEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) LEFT AFT OXIDIZER XFEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT19

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED. NOTE: LOCATION NOT LISTED ON VS70-943099 (43-AJ) DWG LOCATION WAS DETERMINED FROM SSSH AND HTR SYSTEMS BOOK JSC-18549.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 999

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RIGHT AFT FUEL XFEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RIGHT AFT FUEL XFEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT01

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
NO EFFECT. NOT FOUND IN SSSH, HTR SYSTEMS BOOK JSC-18549, OR MML. ASSUMED ERROR IN VS70-943099 DWG.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 1000

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: RIGHT AFT FUSLG LOW PT OXIDIZER DRAIN LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RIGHT AFT FUSLG LOW PT OXIDIZER DRAIN LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT10

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87
SUBSYSTEM: OMS
MDAC ID: 1001

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 3/3

ITEM: RIGHT - AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RIGHT AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT3

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: WORST CASE WOULD BE A FALSE INDICATION OF HTR SYSTEM FAILED "OFF" ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/17/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 2/2
MDAC ID: 1002 ABORT: 3/3

ITEM: RIGHT AFT OXIDIZER XFEED LINE TEMP SENSOR
FAILURE MODE: ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) RIGHT AFT OXIDIZER XFEED LINE TEMP SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 2/2 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43MT20

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING THE CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE WITH A SENSOR INDICATING CROSSFEED TEMPERATURES OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F) WITH OUT FIRST UNDERSTANDING IT WAS A SENSOR FAILURE AND SECOND EXCEPTING THE RISKS OF LOSS OF DETECTABLITY FOR THE THERMAL SYSTEM. (THIS ENSURES XFEED FOR ABORTS)) EFFECT: LOSE FAILURE DETECTION OF ASSOCIATED HTR SYSTEM. HTR SYSTEM IS NOT MISSION CRITICAL, CROSSFEED CAN STILL BE ACCOMPLISHED. NOTE: LOCATION NOT LISTED ON VS70-943099 (43-AJ) DWG LOCATION WAS DETERMINED FROM SSSH AND HTR SYSTEMS BOOK JSC-18549.

REFERENCES: VS70-943099 REV A EO B12; JSC-11174, SSSH, REV C DCN-5; JSC-18549 15 OCT'82, LTR 28 JUNE'85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1003

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OXIDIZER FLEX LINE OVER TEMP (LT DECK)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER FLEX LINE OVER TEMP (LT DECK)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1012; S2012

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1004 ABORT: 3/3

ITEM: FUEL & OXIDIZER FLEX LINE OVER TEMP (LT DECK)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER FLEX LINE OVER TEMP (LT DECK)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1012; S2012

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1005

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OXIDIZER FLEX LINE OVER TEMP (RT DECK)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER FLEX LINE OVER TEMP (RT DECK)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1022; S2022

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1006

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OXIDIZER FLEX LINE OVER TEMP (RT DECK)
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER FLEX LINE OVER TEMP (RT DECK)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1022; S2022

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1007

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OXIDIZER LOWER CENTER FEED LINE OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER CENTER FEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1052; S2052

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1008

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OXIDIZER LOWER CENTER FEED LINE OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER CENTER FEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1052; S2052

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1009

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OX LOWER CENTER XFEED LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER CENTER XFEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1051; S2051

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITITES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1010

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OX LOWER CENTER XFEED LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER CENTER XFEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1051; S2051

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1011 ABORT: 3/3

ITEM: FUEL & OXIDIZER LOWER LEFT FEED LINE OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER LEFT FEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1032; S2032

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1012 ABORT: 3/3

ITEM: FUEL & OXIDIZER LOWER LEFT FEED LINE OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER LEFT FEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1032; S2032

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1013

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OX LOWER LEFT XFEED LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER LEFT XFEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1031; S2031

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1014

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OX LOWER LEFT XFEED LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER LEFT XFEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1031; S2031

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1015

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OXIDIZER LOWER RIGHT FEED LINE OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER RIGHT FEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1042; S2042

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1016

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OXIDIZER LOWER RIGHT FEED LINE OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER RIGHT FEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1042; S2042

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1017

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OX LOWER RIGHT XFEED LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER RIGHT XFEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1041; S2041

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1018

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL & OX LOWER RIGHT XFEED LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL & OXIDIZER LOWER RIGHT XFEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1041; S2041

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1019

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL FLEX LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL FLEX LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1011; S2011

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1020

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL FLEX LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL FLEX LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1011; S2011

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1021

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1101; S2101

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1022

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1101; S2101

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1023

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1102; S2102

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1024

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1102; S2102

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1025

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE T-4 UMB OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE T-4 UMB OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1122; S2122

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1026

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE T-4 UMB OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE T-4 UMB OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1122; S2122

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1027

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE T-4 UMB. CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE T-4 UMB. CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1121; S2121

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1028

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: FUEL HI PT BLEED LINE T-4 UMB. CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) FUEL HI PT BLEED LINE T-4 UMB. CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1121; S2121

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 1029 ABORT: 3/3

ITEM: L FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) L FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1142; S2142

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1030 ABORT: 3/3

ITEM: L FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) L FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1142; S2142

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/3
MDAC ID: 1031 ABORT: 3/3

ITEM: L FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) L FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1141; S2141

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1032 ABORT: 3/3

ITEM: L FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) L FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1141; S2141

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1033 ABORT: 3/3

ITEM: OXIDIZER FLEX LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER FLEX LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1021; S2021

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE COULD RESULT IN LOSS OF ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY WOULD RESULT IN A FAILED "OFF" HTR SYSTEM ON A MISSION CRITICAL CROSSFEED LN. LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1034 ABORT: 3/3

ITEM: OXIDIZER FLEX LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER FLEX LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1021; S2021

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1035

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1111; S2111

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1036

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1111; S2111

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1037

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1112; S2112

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1038

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1112; S2112

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1039

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE T-4 UMB OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE T-4 UMB OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1132; S2132

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1040

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE T-4 UMB OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE T-4 UMB OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1132; S2132

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1041

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE T-4 UMB. CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE T-4 UMB. CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1131; S2131

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1042

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: OXIDIZER HI PT BLEED LINE T-4 UMB. CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) OXIDIZER HI PT BLEED LINE T-4 UMB. CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 40V43S1131; S2131

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1043

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: R FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) R FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1152; S2152

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1044

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: R FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) R FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1152; S2152

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87
SUBSYSTEM: OMS
MDAC ID: 1045

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: R FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) R FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1151; S2151

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: LOSE ASSOCIATED HTR SYSTEM. SECOND FAILURE RESULTS IN LOSS OF REDUNDANT SYSTEM. THE HTR SYSTEM IS NOT MISSION CRITICAL. CROSSFEED CAN STILL BE ACCOMPLISHED.

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OMS FLIGHT: 3/2R
MDAC ID: 1046 ABORT: 3/3

ITEM: R FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
FAILURE MODE: FAILS SHORT

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) R FUEL & OXIDIZER LO PT DRAIN LINE CONTROL TEMP
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT BODY
PART NUMBER: 50V43S1151; S2151

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
IN DETERMINING CRITICALITIES IT IS ASSUMED A LAUNCH WOULD NOT TAKE PLACE IF TEMPERATURES ON THE MAIN CROSSFEED LN'S WERE OUTSIDE THE DESIRED LIMITS (<50 F OR >90 F). THIS WILL ENSURE CROSSFEED CAPABILITIES FOR ABORTS. EFFECTS: FIRST FAILURE RESULTS IN AN INCREASE OF THE HTR SYSTEM'S OPERATING RANGE (75 F TO 90 F). SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC-18549 15OCT82, LTR 28JUNE85; JSC 20923 PCN-1; MC363-0031 REV C AMENDMENT SEQ 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 1047

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH TOGGLE, OMS XFEED LINES A AUTO (S7)
FAILURE MODE: FAILS TO SWITCH (STUCK IN OFF POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, OMS XFEED LINES A AUTO (S7)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S7

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO TURN OFF "A" XFEED HTR SYSTEM. CONTROL THERMOSTATS WILL MAINTAIN PROPER THERMAL ENVIRONMENT. SECOND FAILURE IN REDUNDANT SYSTEM RESULTS IN BOTH "A" & "B" XFEED HTR SYSTEMS STUCK IN AUTO MODE.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85; MF004-400 REV C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87
SUBSYSTEM: OMS
MDAC ID: 1048

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH TOGGLE, OMS XFEED LINES A AUTO (S7)
FAILURE MODE: FAILS TO SWITCH (STUCK IN AUTO POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, OMS XFEED LINES A AUTO (S7)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S7

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO TURN OFF "A" XFEED HTR SYSTEM. CONTROL THERMOSTATS WILL MAINTAIN PROPER THERMAL ENVIRONMENT. SECOND FAILURE IN REDUNDANT SYSTEM RESULTS IN BOTH "A" & "B" XFEED HTR SYSTEMS STUCK IN AUTO MODE.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85; MF0004-400 REV C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 1049

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH TOGGLE, OMS XFEED LINES B AUTO (S8)
FAILURE MODE: FAILS TO SWITCH (STUCK IN OFF POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, OMS XFEED LINES B AUTO (S8)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/2R | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S8

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF MISSION DUE TO LOSS OF INTERCONNECT/XFEED CAPABILITY, LOSS OF ENGINE REDUNDANCY, LOSS OF PROTECTION AGAINST SUBSEQUENT ENGINE OR PROP FAILURES, AND LOSS OF CAPABILITY TO BALANCE PROP WEIGHTS BETWEEN PODS IF PREVIOUS FAILURE REQUIRES SUCH ACTION.

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85; MF0004-400 REV C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/05/87
SUBSYSTEM: OMS
MDAC ID: 1050

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: SWITCH TOGGLE, OMS XFEED LINES B AUTO (S8)
FAILURE MODE: FAILS TO SWITCH (STUCK IN AUTO POSITION)

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CROSSFEED
3) THERMAL CONTROL SUBSYSTEM
4) SWITCH TOGGLE, OMS XFEED LINES B AUTO (S8)
5)
6)
7)
8)
9)

CRITICALITIES

| FLIGHT PHASE | HDW/FUNC | ABORT | HDW/FUNC |
|---|---|---|---|
| PRELAUNCH: | 3/3 | RTLS: | 3/3 |
| LIFTOFF: | 3/3 | TAL: | 3/3 |
| ONORBIT: | 3/3 | AOA: | 3/3 |
| DEORBIT: | 3/3 | ATO: | 3/3 |
| LANDING/SAFING: | 3/3 | | |

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 14
PART NUMBER: 36V73A14-S8

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:
LOSE ABILITY TO TURN OFF "A" XFEED HTR SYSTEM. CONTROL THERMOSTATS WILL MAINTAIN PROPER THERMAL ENVIRONMENT. SECOND FAILURE IN REDUNDANT SYSTEM RESULTS IN BOTH "A" & "B" XFEED HTR SYSTEMS STUCK IN AUTO MODE.
SECOND FAILURE IN THE SAME SYSTEM (OVERTEMP THERMOSTAT) WILL RESULT IN THE LOSS OF THE ASSOCIATED HTR GROUP A OR B. LOSS OF ALL REDUNDANCY RESULTS IN BOTH ELEMENTS OF ONE OR MORE HTR'S FAILED "ON" WHICH COULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS (OVER TEMP OF CROSSFEED LNS). (ONE HTR ELEMENT FAILED "ON" CONTINUOUSLY CAN HAVE A SURFACE TEMP AS HIGH AS 352 F.)

REFERENCES: VS70-943099 REV A EO B12; JSC 18549, OCT 82, LTR JUNE 85; MF004-400 REV C

APPENDIX D
POTENTIAL CRITICAL ITEMS

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 100 | TANK, HELIUM STORAGE | RUPTURE |
| 101 | TANK, HELIUM STORAGE | EXTERNAL LEAKAGE |
| 102 | COUPLING, HELIUM FILL | EXTERNAL LEAKAGE |
| 105 | LINES AND MECHANICAL FITTINGS HELIUM PRESSURE | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 106 | LINES AND MECHANICAL FITTINGS HELIUM PRESSURE | RESTRICTED FLOW, BLOCKAGE |
| 107 | VALVE, HELIUM ISOLATION | FAILS TO OPEN, FAILS TO REMAIN OPEN |
| 108 | VALVE, HELIUM ISOLATION | FAILS TO CLOSE, FAILS TO REMAIN CLOSED |
| 109 | VALVE, HELIUM ISOLATION | INTERNAL LEAKAGE |
| 110 | VALVE, HELIUM ISOLATION | EXTERNAL LEAKAGE |
| 111 | VALVE, HELIUM ISOLATION | RESTRICTED FLOW |
| 116 | LINES AND MECHANICAL FITTINGS HELIUM PRESSURE | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 117 | LINES AND MECHANICAL FITTINGS HELIUM PRESSURE | RESTRICTED FLOW, BLOCKAGE |
| 118 | REGULATOR ASSY, HELIUM PRESSURE | FAILS TO REGULATE, INTERNAL LEAKAGE, HIGH OUTPUT, FAILS TO LOCKUP, FAILS TO CLOSE |
| 119 | REGULATOR ASSEMBLY, HELIUM PRESSURE | FAILS TO OPEN |
| 120 | REGULATOR ASSEMBLY, HELIUM PRESSURE | FAILS OUT OF TOLERANCE, LOW OUTPUT, REGULATES AT LOWER THAN NORMAL PRESSURE |
| 121 | REGULATOR ASSEMBLY, HELIUM PRESSURE | RESTRICTED FLOW |
| 122 | REGULATOR ASSEMBLY, HELIUM PRESSURE | EXTERNAL LEAKAGE |
| 126 | VALVE, VAPOR ISOLATION-OXIDIZER | FAILS TO OPEN, FAILS TO REMAIN OPEN |
| 127 | VALVE, VAPOR ISOLATION-OXIDIZER | FAILS TO CLOSE, FAILS TO REMAIN CLOSED |
| 128 | VALVE, VAPOR ISOLATION-OXIDIZER | INTERNAL LEAKAGE, REVERSE FLOW |
| 129 | VALVE, VAPOR ISOLATION-OXIDIZER | EXTERNAL LEAKAGE |
| 130 | VALVE, VAPOR ISOLATION-OXIDIZER | RESTRICTED FLOW |
| 132 | VALVE, QUAD CHECK VALVES | FAILS TO OPEN |
| 133 | VALVE, QUAD CHECK VALVES, FUEL | FAILS TO CLOSE, INTERNAL LEAKAGE, REVERSE FLOW |
| 134 | VALVE, QUAD CHECK VALVES, OXIDIZER | FAILS TO CLOSE, INTERNAL LEAKAGE, REVERSE FLOW |
| 135 | VALVE, QUAD CHECK VALVES | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 136 | VALVE, QUAD CHECK VALVES | RESTRICTED FLOW |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 141 | VALVE-PRESSURE RELIEF ASSEMBLY | FAILS OUT OF TOLERANCE, FAILS TO OPEN, BURST DISK FAILS TO RUPTURE, RELIEF VALVE FAILS TO OPEN |
| 142 | VALVE-PRESSURE RELIEF ASSEMBLY | FAILS OUT OF TOLERANCE, BURST DISK RUPTURES AT LOWER THAN BURST PRESSURE |
| 143 | VALVE-PRESSURE RELIEF ASSEMBLY | BURST DISK LEAK, INTERNAL LEAKAGE |
| 144 | VALVE-PRESSURE RELIEF ASSEMBLY | FAILS TO CLOSE, RELIEF VALVE FAILS TO RESEAT (OPENS AFTER BURST DISK RUPTURE) |
| 145 | VALVE-PRESSURE RELIEF ASSEMBLY | EXTERNAL LEAKAGE |
| 149 | PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO | RESTRICTED FLOW, BLOCKAGE |
| 150 | COUPLING-TEST PORT, PROPELLANT PRESSURE CHECK | EXTERNAL LEAKAGE |
| 153 | VALVE-GROUND, MANUAL ISOLATION | FAILS TO REMAIN OPEN |
| 155 | VALVE-GROUND, MANUAL ISOLATION | EXTERNAL LEAKAGE |
| 156 | COUPLING-TANK VENT | EXTERNAL LEAKAGE |
| 159 | PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO | RESTRICTED FLOW, BLOCKAGE |
| 160 | GIMBAL BELLOWS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 161 | GIMBAL BELLOWS | FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION |
| 162 | GIMBAL BELLOWS | RESTRICTED FLOW |
| 163 | PROPELLANT TANK | RUPTURE |
| 164 | PROPELLANT TANK | STRUCTURAL FAILURE, EXTERNAL LEAKAGE |
| 165 | COUPLING-PROP TANK, HORIZONTAL DRAIN PORT | EXTERNAL LEAKAGE |
| 168 | COUPLING-TANK ACQ. SYSTEM TRAP FILL/VENT PORT | EXTERNAL LEAKAGE |
| 171 | COUPLING-TANK ACQ. SYSTEM FILL/VENT PORT | EXTERNAL LEAKAGE |
| 174 | COUPLING-PROPELLANT, TANK TEST PORT | EXTERNAL LEAKAGE |
| 190 | COMMUNICATION SCREEN | STRUCTURAL FAILURE, LOSS OF RETENTION CAPABILITY |
| 191 | COMMUNICATION SCREEN | STRUCTURAL FAILURE, HELIUM PASSAGE |
| 192 | GALLERY LEGS | STRUCTURAL FAILURE, HELIUM PASSAGE |
| 193 | COLLECTOR MANIFOLD | STRUCTURAL FAILURE, HELIUM PASSAGE |
| 194 | PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 195 | GIMBAL BELLOWS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 196 | GIMBAL BELLOWS | FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION |
| 197 | GIMBAL BELLOWS | RESTRICTED FLOW |
| 198 | VALVE-PROPELLANT TANK ISOLATION | FAILS TO OPEN, FAILS TO REMAIN OPEN |
| 200 | VALVE-PROPELLANT TANK ISOLATION | FAILS MID-TRAVEL, PARTIALLY OPEN/CLOSED |
| 202 | VALVE-PROPELLANT TANK ISOLATION | EXTERNAL LEAKAGE |
| 203 | VALVE-PROPELLANT TANK ISOLATION | RESTRICTED FLOW |
| 205 | VALVE-PROPELLANT TANK ISOLATION | FAILS OUT OF TOLERANCE, RELIEF VALVE FAILS TO RELIEVE |
| 206 | PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO | RESTRICTED FLOW, BLOCKAGE |
| 207 | COUPLING-PROPELLANT LOW POINT DRAIN | EXTERNAL LEAKAGE |
| 210 | COUPLING-OMS/RCS PROPELLANT FILL PORT | EXTERNAL LEAKAGE |
| 213 | COUPLING-PROPELLANT GROUND PURGE | EXTERNAL LEAKAGE |
| 216 | CROSSFEED GIMBAL JOINT | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 217 | CROSSFEED GIMBAL JOINT | FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION |
| 218 | CROSSFEED GIMBAL JOINT | RESTRICTED FLOW |
| 219 | FLEXIBLE LINE ASSEMBLY | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 220 | FLEXIBLE LINE ASSEMBLY | RESTRICTED FLOW |
| 221 | CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS | RESTRICTED FLOW, BLOCKAGE |
| 222 | CROSSFEED PROPELLANT LINES AND MECHANICAL FITTINGS | RESTRICTED FLOW, BLOCKAGE |
| 227 | VALVE-CROSSFEED | EXTERNAL LEAKAGE |
| 228 | VALVE-CROSSFEED | RESTRICTED FLOW |
| 230 | VALVE-CROSSFEED | FAILS OUT OF TOLERANCE, RELIEF VALVE FAILS TO RELIEVE |
| 231 | COUPLING-HIGH POINT BLEED | EXTERNAL LEAKAGE |
| 234 | COUPLING-CROSSFEED DRAIN | EXTERNAL LEAKAGE |
| 238 | PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO | RESTRICTED FLOW, BLOCKAGE |
| 239 | GIMBAL BELLOWS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 240 | GIMBAL BELLOWS | FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 241 | GIMBAL BELLOWS | RESTRICTED FLOW |
| 242 | GIMBAL BELLOWS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 243 | GIMBAL BELLOWS | FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION |
| 244 | GIMBAL BELLOWS | RESTRICTED FLOW |
| 245 | ALIGNMENT BELLOWS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 246 | ALIGNMENT BELLOWS | FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION |
| 247 | ALIGNMENT BELLOWS | RESTRICTED FLOW |
| 248 | ENGINE INLET FILTER AND ORIFICE | STRUCTURAL FAILURE, CONTAMINATION PASSAGE |
| 249 | ENGINE INLET FILTER AND ORIFICE | RESTRICTED FLOW, CLOGGED |
| 250 | BELLOWS-TVC GIMBAL | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 251 | BELLOWS-TVC GIMBAL | FAILS OUT OF TOLERANCE, PHYSICAL BINDING/JAMMING, NO BELLOWS ANGULAR DEFLECTION |
| 252 | BELLOWS-TVC GIMBAL | RESTRICTED FLOW |
| 253 | COUPLING-HIGH POINT BLEED TEST PORT | EXTERNAL LEAKAGE |
| 256 | VALVE - BIPROPELLANT VALVE | FAILS TO OPEN, FAILS TO REMAIN OPEN, RESTRICTED FLOW |
| 257 | VALVE - BIPROPELLANT VALVE | FAILS TO CLOSE, FAILS TO REMAIN CLOSED |
| 258 | VALVE - BIPROPELLANT VALVE | FAILS MID TRAVEL, PARTIALLY OPEN/CLOSED |
| 259 | VALVE - BIPROPELLANT VALVE | INTERNAL LEAKAGE |
| 260 | VALVE - BIPROPELLANT VALVE | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 261 | VALVE - BIPROPELLANT VALVE | DELAYED OPERATION |
| 262 | VALVE - BIPROP CAVITY PRESSURE RELIEF | FAILS TO OPEN, FAILS TO OPEN AT SPECIFIED PSID |
| 265 | VALVE - BIPROP CAVITY PRESSURE RELIEF | STRUCTURAL FAILURE, EXTERNAL LEAKAGE |
| 267 | COUPLING - BIPROP VALVE DRAIN/ PURGE TEST PORT | EXTERNAL LEAKAGE |
| 270 | OME ALIGNMENT BELLOWS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 272 | OME ALIGNMENT BELLOWS | RESTRICTED FLOW |
| 273 | COUPLING - BIPROP VALVE DRAIN PORT | EXTERNAL LEAKAGE |
| 276 | PROPELLANT LINES AND MECHANICAL FITTINGS-MMH AND NTO | RESTRICTED FLOW, BLOCKAGE |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 277 | COUPLING-OMS ENGINE TRICKLE PURGE PORT | EXTERNAL LEAKAGE |
| 280 | PLATELET INJECTOR ASSEMBLY | STRUCTURAL FAILURE, BURN THROUGH |
| 281 | PLATELET INJECTOR ASSEMBLY | STRUCTURAL FAILURE, INTERNAL LEAKAGE |
| 282 | PLATELET INJECTOR ASSEMBLY | RESTRICTED FLOW, CLOGGED |
| 283 | COMBUSTION CHAMBER | STRUCTURAL FAILURE, BURN THROUGH |
| 284 | COMBUSTION CHAMBER | STRUCTURAL FAILURE, FRACTURE |
| 285 | NOZZLE EXTENSION | STRUCTURAL FAILURE, BURN THROUGH, FRACTURE, DEFORMATION, FLANGE LEAKAGE |
| 286 | NOZZLE EXTENSION | STRUCTURAL FAILURE, BUCKLING (DURING ASCENT) |
| 290 | GN2 PRESSURE LINES AND MECHANICAL FITTINGS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 295 | TANK-GN2 STORAGE | RUPTURE |
| 298 | PNEUMATIC PACK HOUSING ASSEMBLY | RESTRICTED FLOW, BLOCKAGE |
| 303 | VALVE-GN2 PRESSURE ISOLATION | RESTRICTED FLOW |
| 305 | GN2 PRESSURE REGULATOR | FAILS TO OPEN |
| 308 | GN2 PRESSURE REGULATOR | FAILS OUT OF TOLERANCE, REGULATES AT LOW PRESSURE |
| 309 | GN2 PRESSURE REGULATOR | RESTRICTED FLOW |
| 319 | CHECK VALVE-GN2 | FAILS TO OPEN |
| 320 | CHECK VALVE-GN2 | FAILS TO CLOSE, VALVE FAILS TO RESEAT |
| 321 | CHECK VALVE-GN2 | INTERNAL LEAKAGE |
| 322 | GN2 ACCUMULATOR | RUPTURE |
| 323 | GN2 ACCUMULATOR | STRUCTURAL FAILURE, EXTERNAL LEAKAGE |
| 324 | GN2 PRESSURE LINES AND MECHANICAL FITTINGS | STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE |
| 325 | GN2 PRESSURE LINES AND MECHANICAL FITTINGS | RESTRICTED FLOW, BLOCKAGE |
| 326 | VALVE-ENGINE CONTROL | FAILS TO OPEN, FAILS TO REMAIN OPEN |
| 327 | VALVE-ENGINE CONTROL | FAILS TO CLOSE, FAILS TO REMAIN CLOSED |
| 328 | VALVE-ENGINE CONTROL | INTERNAL LEAKAGE |
| 329 | VALVE-ENGINE CONTROL | EXTERNAL LEAKAGE |
| 330 | VALVE-ENGINE CONTROL | RESTRICTED FLOW |
| 331 | VALVE-ENGINE CONTROL | DELAYED OPERATION |
| 332 | ORIFICE-ENGINE CONTROL VALVE INLET | RESTRICTED FLOW |
| 333 | ORIFICE-ENGINE CONTROL VALVE VENT | RESTRICTED FLOW, INABILITY TO VENT GN2 TO AMBIENT. |
| 334 | CHECK VALVE-ENGINE CONTROL VALVE VENT | FAILS TO OPEN |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 335 | CHECK VALVE-ENGINE CONTROL VALVE VENT | FAILS TO CLOSE |
| 336 | CHECK VALVE-ENGINE CONTROL VALVE VENT | INTERNAL LEAKAGE |
| 337 | PNEUMATIC ACTUATOR | FAILS TO OPEN, FAILS TO OPERATE, PHYSICAL BINDING/JAMMING |
| 338 | PNEUMATIC ACTUATOR | FAILS TO CLOSE, PHYSICAL BINDING/JAMMING |
| 339 | PNEUMATIC ACTUATOR | FAILS MID-TRAVEL, PARTIALLY OPEN/CLOSED, PHYSICAL BINDING/JAMMING |
| 340 | PNEUMATIC ACTUATOR | INTERNAL LEAKAGE, PISTON SEAL LEAKAGE |
| 341 | PNEUMATIC ACTUATOR | RUPTURE |
| 343 | PNEUMATIC ACTUATOR | EXTERNAL LEAKAGE (GN2) |
| 344 | PNEUMATIC ACTUATOR | DELAYED OPERATION |
| 348 | PINION GEAR AND DRIVE ASSEMBLY | FAILS TO OPERATE, PHYSICAL BINDING/JAMMING |
| 349 | PINION GEAR AND DRIVE ASSEMBLY | STRUCTURAL FAILURE, FRACTURE |
| 353 | VALVE-GN2 PURGE | INTERNAL LEAKAGE |
| 358 | CHECK VALVE-GN2 PURGE | FAILS TO CLOSE |
| 359 | CHECK VALVE-GN2 PURGE | INTERNAL LEAKAGE |
| 362 | GIMBAL RING | STRUCTURAL FAILURE |
| 363 | BEARING-GIMBAL RING | FAILS TO FUNCTION, PHYSICAL BINDING/JAMMING |
| 364 | GIMBAL RING MOUNTING PAD | STRUCTURAL FAILURE, FRACTURE |
| 367 | ACME SCREW/NUT TUBE | FAILS TO OPERATE, PHYSICAL BINDING/JAMMING BETWEEN ACME SCREW AND NUT TUBE |
| 368 | ACME SCREW/NUT TUBE | STRUCTURAL FAILURE, FRACTURE |
| 373 | ANTI-BACK DEVICE | STRUCTURAL FAILURE, FRACTURE |
| 376 | BEARING-SPHERICAL ROD END | PHYSICAL BINDING/JAMMING |
| 377 | BEARING-SPHERICAL ROD END | STRUCTURAL FAILURE, FRACTURE |
| 378 | MECHANICAL STOP-SNUBBER | STRUCTURAL FAILURE, FAILS OUT OF TOLERANCE |
| 381 | OUTPUT SHAFT | STRUCTURAL FAILURE, FRACTURE, DISATTACHMENT OF ACTUATOR TO ENGINE |
| 399 | CONTROLLER, REMOTE POWER | FAILS HIGH |
| 410 | DIODE | FAILS OPEN |
| 411 | DIODE | FAILS SHORT |
| 416 | DIODE | FAILS OPEN (LOSS OF OUTPUT) |
| 417 | DIODE | FAILS SHORT |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 418 | DIODE | FAILS OPEN (LOSS OF OUTPUT) |
| | | FAILS SHORT |
| 419 | DIODE | FAILS TO SWITCH (STUCK IN THE CLOSE POSITION) |
| 439 | SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A | FAILS TO SWITCH (STUCK IN THE GPC POSITION) |
| 440 | SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV A | FAILS TO SWITCH (STUCK IN THE CLOSE POSITION) |
| 441 | SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B | FAILS TO SWITCH (STUCK IN THE GPC POSITION) |
| 443 | SWITCH TOGGLE, LT/RT OMS HE PRESS VAPOR ISOL VLV B | FAILS OPEN |
| 450 | DIODE | FAILS SHORT |
| 451 | DIODE | FAILS OPEN |
| 452 | DIODE | FAILS SHORT |
| 453 | DIODE | FAILS OPEN |
| 454 | DIODE | FAILS SHORT |
| 455 | DIODE | FAILS OPEN |
| 456 | DIODE | FAILS SHORT |
| 457 | DIODE | FAILS OPEN (FAILS TO ENERGIZE) |
| 482 | RELAY | FAILS OPEN |
| 484 | RELAY | FAILS OPEN (FAILS TO ENERGIZE) |
| 486 | RELAY | FAILS OPEN (FAILS TO ENERGIZE) |
| 488 | RELAY | FAILS OPEN (RELAY FAILS TO ENERGIZE) |
| 492 | RELAY | FAILS OPEN (RELAY FAILS TO ENERGIZE) |
| 496 | RELAY | FAILS OPEN (FAILS TO ENERGIZE) |
| 498 | RELAY | FAILS OPEN (FAILS TO ENERGIZE) |
| 500 | RELAY | FAILS OPEN (FAILS TO ENERGIZE) |
| 502 | RELAY | FAILS OPEN (FAILS TO ENERGIZE) |
| 504 | RELAY | FAILS OPEN (RELAY FAILS TO ENERGIZE) |
| 508 | RELAY | FAILS OPEN (RELAY FAILS TO ENERGIZE) |
| 513 | RELAY | FAILS OPEN |
| 514 | RESISTOR, 1.2K 1/4W | FAILS SHORT |
| 517 | RESISTOR, 12K 1/4W | FAILS OPEN |
| 518 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 520 | RESISTOR, 1.2K 1/4W | FAILS SHORT |
| 523 | RESISTOR, 12K 1/4W | FAILS OPEN |
| 524 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 526 | RESISTOR, 1.2K 2W | FAILS SHORT |
| 528 | RESISTOR, 12K 1/4W | FAILS OPEN |
| 530 | RESISTOR, 5.1K 1/4W | |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 532 | RESISTOR, 1.2K 2W | FAILS OPEN |
| 535 | RESISTOR, 12K 1/4W | FAILS SHORT |
| 537 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 538 | RESISTOR, 1.2K 1/4W | FAILS OPEN |
| 544 | RESISTOR, 1.2K 1/4W | FAILS OPEN |
| 558 | RESISTOR, 1.2K 1/4W | FAILS OPEN |
| 561 | RESISTOR, 12K 1/4W | FAILS SHORT |
| 562 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 564 | RESISTOR, 1.2K 1/4W | FAILS OPEN |
| 567 | RESISTOR, 12K 1/4W | FAILS SHORT |
| 568 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 570 | RESISTOR, 1.2K 2W | FAILS OPEN |
| 572 | RESISTOR, 1.2K 2W | FAILS OPEN |
| 575 | RESISTOR, 12K 1/4W | FAILS SHORT |
| 576 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 578 | RESISTOR, 1.2K 1/4W | FAILS OPEN |
| 580 | RESISTOR, 1.2K 2W | FAILS OPEN |
| 583 | RESISTOR, 12K 1/4W | FAILS SHORT |
| 584 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 594 | SWITCH TOGGLE LT/RT | FAILS TO SWITCH (STUCK IN CLOSE POSITION) |
| 595 | SWITCH TOGGLE LT/RT | FAILS TO SWITCH (STUCK IN GPL POSITION) |
| 610 | SENSOR TEMPERATURE, FUEL TANK LOWER | ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE) |
| 611 | SENSOR TEMPERATURE, OX LOWER TANK | ERRONEOUS OUTPUT (SHORTED, OPENED, FAILES-OUT-OF-TOLERANCE) |
| 622 | DRIVER, HYBRID | FAILS OPEN |
| 624 | DRIVER, HYBRID | FAILS OPEN |
| 626 | DRIVER, HYBRID | FAILS OPEN |
| 628 | DRIVER, HYBRID | FAILS OPEN |
| 630 | DRIVER, HYBRID | FAILS OPEN |
| 631 | DRIVER, HYBRID | FAILS HIGH |
| 632 | DRIVER, HYBRID | FAILS OPEN |
| 633 | DRIVER, HYBRID | FAILS HIGH |
| 634 | DRIVER, HYBRID | FAILS OPEN |
| 636 | DRIVER, HYBRID | FAILS OPEN |
| 638 | DRIVER, HYBRID | FAILS OPEN |
| 639 | DRIVER, HYBRID | FAILS HIGH |
| 640 | DRIVER, HYBRID | FAILS OPEN |
| 641 | DRIVER, HYBRID | FAILS HIGH |
| 644 | FUSE, 1A | FAILS OPEN |
| 645 | FUSE, 1A | FAILS OPEN |
| 646 | FUSE, 1A | FAILS OPEN |
| 647 | FUSE, 1A | FAILS OPEN |
| 648 | FUSE, 3A | FAILS OPEN |
| 649 | FUSE, 3A | FAILS OPEN |
| 650 | FUSE, 3A | FAILS OPEN |
| 651 | FUSE, 3A | FAILS OPEN |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 661 | RESISTOR, 5.1K 1/4W | FAILS SHORT |
| 662 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 664 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 666 | RESISTOR, 5.1K 1/4W | FAILS SHORT |
| 667 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 670 | RESISTOR, 5.1K 1/4W | FAILS OPEN |
| 672 | SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2) | FAILS TO SWITCH (STUCK IN ARM/PRESS POSITION) |
| 673 | SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2) | FAILS TO SWITCH (STUCK IN ARM POSITION) |
| 674 | SWITCH, OMS LT/RT ENG ARM/PRESS (C3A1, S1/S2) | FAILS TO SWITCH (STUCK IN OFF POSITION) |
| 675 | SWITCH, OMS LT/RT ENG CONTROL VLV | FAILS TO SWITCH (STUCK IN OFF POSITION) |
| 676 | SWITCH, OMS LT/RT ENG CONTROL VLV | FAILS TO SWITCH (STUCK IN ON POSITION) |
| 689 | SENSOR PRESSURE, OMS ENGINE REG OUT | ERRONEOUS OUTPUT (OPEN, SHORTED, FAILS OUT OF TOLERANCE) |
| 698 | SENSOR TEMPERATURE ENGINE FUEL FEED LINE | ERRONEOUS OUTPUT (SHORTED, OPENED, FAILS-OUT-OF-TOLERANCE) |
| 706 | DRIVER, HYBRID | FAILS HIGH |
| 708 | DRIVER, HYBRID | FAILS HIGH |
| 710 | DRIVER, HYBRID | FAILS HIGH |
| 712 | DRIVER, HYBRID | FAILS HIGH |
| 714 | DRIVER, HYBRID | FAILS HIGH |
| 715 | DRIVER, HYBRID | FAILS HIGH |
| 718 | DRIVER, HYBRID | FAILS HIGH |
| 720 | DRIVER, HYBRID | FAILS HIGH |
| 722 | DRIVER, HYBRID | FAILS HIGH |
| 724 | DRIVER, HYBRID | FAILS HIGH |
| 726 | DRIVER, HYBRID | FAILS HIGH |
| 728 | DRIVER, HYBRID | FAILS HIGH |
| 730 | DRIVER, HYBRID | FAILS HIGH |
| 732 | DRIVER, HYBRID | FAILS HIGH |
| 734 | DRIVER, HYBRID | FAILS HIGH |
| 736 | DRIVER, HYBRID | FAILS HIGH |
| 738 | DRIVER, HYBRID | FAILS HIGH |
| 740 | DRIVER, HYBRID | FAILS HIGH |
| 742 | DRIVER, HYBRID | FAILS HIGH |
| 744 | DRIVER, HYBRID | FAILS HIGH |
| 746 | DRIVER, HYBRID | FAILS HIGH |
| 747 | DRIVER, HYBRID | FAILS HIGH |
| 782 | HEATER, LT/RT ENG SERV PNL GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 773 | HEATER, LT/RT ENG SERV PNL GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 784 | HEATER, LT/RT ENG SERV PNL GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 785 | HEATER, LT/RT ENG SERV PNL GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 786 | HEATER, LT/RT GSE SERVICE PNL GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 787 | HEATER, LT/RT GSE SERVICE PNL GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 788 | HEATER, LT/RT GSE SERVICE PNL GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 789 | HEATER, LT/RT GSE SERVICE PNL GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 790 | HEATER, LT/RT LOWER INBD Y WEB GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 791 | HEATER, LT/RT LOWER INBD Y WEB GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 792 | HEATER, LT/RT LOWER INBD Y WEB GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 793 | HEATER, LT/RT LOWER INBD Y WEB GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 794 | HEATER, LT/RT OME COMPT GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 795 | HEATER, LT/RT OME COMPT GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 797 | HEATER, LT/RT OME COMPT GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 806 | HEATER, LT/RT OMS KEEL WEB GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 807 | HEATER, LT/RT OMS KEEL WEB GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 808 | HEATER, LT/RT OMS KEEL WEB GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 809 | HEATER, LT/RT OMS KEEL WEB GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 815 | HEATER, LT/RT OX PRESS PNL GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 817 | HEATER, LT/RT OX PRESS PNL GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 818 | HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 819 | HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 820 | HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 821 | HEATER, LT/RT RCS HOUSING DRAIN PNL GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 822 | HEATER, LT/RT RCS HOUSING PITCH DN GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 823 | HEATER, LT/RT RCS HOUSING PITCH DN GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 824 | HEATER, LT/RT RCS HOUSING PITCH DN GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 825 | HEATER, LT/RT RCS HOUSING PITCH DN GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 826 | HEATER, LT/RT RCS HOUSING PITCH UP GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 827 | HEATER, LT/RT RCS HOUSING PITCH UP GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 828 | HEATER, LT/RT RCS HOUSING PITCH UP GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 829 | HEATER, LT/RT RCS HOUSING PITCH UP GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 830 | HEATER, LT/RT RCS HOUSING VERNIER GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 831 | HEATER, LT/RT RCS HOUSING VERNIER GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 832 | HEATER, LT/RT RCS HOUSING VERNIER GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 833 | HEATER, LT/RT RCS HOUSING VERNIER GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 834 | HEATER, LT/RT RCS HOUSING YAW GROUP 1 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 835 | HEATER, LT/RT RCS HOUSING YAW GROUP 1 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 836 | HEATER, LT/RT RCS HOUSING YAW GROUP 2 | FAILS OPEN, FAILS TO PROVIDE HEAT |
| 837 | HEATER, LT/RT RCS HOUSING YAW GROUP 2 | FAILS SHORT, SHORTS TO MOUNTING RESULTING IN OPEN CIRCUIT |
| 846 | RELAY | FAILS HIGH (ENERGIZED POSITION) |
| 848 | RELAY | FAILS HIGH |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 850 | RELAY | FAILS HIGH (FAILS ENERGIZED) |
| 852 | RELAY | FAILS HIGH |
| 895 | THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 1 | FAILS SHORT |
| 897 | THERMAL SWITCH, LT/RT GSE SERVICE PNL GROUP 2 | FAILS SHORT |
| 899 | THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 1 | FAILS SHORT |
| 901 | THERMAL SWITCH, LT/RT KEEL WEB HEATER SYSTEM GROUP 2 | FAILS SHORT |
| 903 | THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 1 | FAILS SHORT |
| 905 | THERMAL SWITCH, LT/RT LOWER INBOARD Y WEB GROUP 2 | FAILS SHORT |
| 907 | THERMAL SWITCH, LT/RT OME COMPT GROUP 1 | FAILS SHORT |
| 907 | THERMAL SWITCH, LT/RT OME COMPT GROUP 2 | FAILS SHORT |
| 911 | THERMAL SWITCH, LT/RT OME COVER GROUP 1 | FAILS SHORT |
| 913 | THERMAL SWITCH, LT/RT OME COVER GROUP 2 | FAILS SHORT |
| 915 | THERMAL SWITCH, LT/RT RCS HOUSING GROUP 1 | FAILS SHORT |
| 917 | THERMAL SWITCH, LT/RT RCS HOUSING GROUP 2 | FAILS SHORT |
| 919 | THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 1 | FAILS SHORT |
| 921 | THERMAL SWITCH, LT/RT UPPER INBOARD Y-WEB GROUP 2 | FAILS SHORT |
| 923 | THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 1 | FAILS SHORT |
| 925 | THERMAL SWITCH, LT/RT UPPER OUTBOARD Y WEB GROUP 2 | FAILS SHORT |
| 926 | SWITCH, TOGGLE RCS/OMS HEATER LT/RT POD GROUP 1 | FAILS TO SWITCH (STUCK IN ON POSITION) |
| 927 | SWITCH, TOGGLE RCS/OMS HEATER LT/RT POD GROUP 2 | FAILS TO SWITCH (STUCK IN ON POSITION) |
| 952 | FUEL AND OXIDIZER LOWER CENTER FEED LINE (XFEED) HEATER ELEMENT (A/B) | FAILS OPEN |
| 953 | FUEL AND OXIDIZER LOWER CENTER FEED LINE (XFEED) HEATER ELEMENT (A/B) | FAILS SHORT |
| 954 | FUEL AND OXIDIZER LOWER LEFT FEED LINE (XFEED) HEATER ELEMENT (A/B) | FAILS OPEN |
| 955 | FUEL AND OXIDIZER LOWER LEFT FEED LINE (XFEED) HEATER ELEMENT (A/B) | FAILS SHORT |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 956 | FUEL AND OXIDIZER LOWER RIGHT FEED LINE (XFEED) HEATER ELEMENT (A/B) | FAILS OPEN |
| 957 | FUEL AND OXIDIZER LOWER RIGHT FEED LINE (XFEED) HEATER ELEMENT (A/B) | FAILS SHORT |
| 964 | LEFT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B) | FAILS OPEN |
| 965 | LEFT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B) | FAILS OPEN |
| 972 | RIGHT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B) | FAILS OPEN |
| 973 | RIGHT FUEL AND OXIDIZER FLEX LINE HEATER ELEMENTS (A/B) | FAILS SHORT |
| 976 | RELAY | FAILS HIGH |
| 994 | CENTER - AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR | ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE) |
| 997 | LEFT - AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR | ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE) |
| 998 | LEFT AFT OXIDIZER XFEED LINE TEMP SENSOR | ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE) |
| 1001 | RIGHT - AFT FUSLG OXIDIZER XFEED LINE TEMP SENSOR | ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE) |
| 1002 | RIGHT AFT OXIDIZER XFEED LINE TEMP SENSOR | ERRONEOUS OUTPUT (SHORTED, OPEN, FAILS-OUT-OF-TOLERANCE) |
| 1003 | FUEL & OXIDIZER FLEX LINE OVER TEMP (LT DECK) | FAILS OPEN |
| 1004 | FUEL & OXIDIZER FLEX LINE OVER TEMP (LT DECK) | FAILS SHORT |
| 1005 | FUEL & OXIDIZER FLEX LINE OVER TEMP (RT DECK) | FAILS OPEN |
| 1006 | FUEL & OXIDIZER FLEX LINE OVER TEMP (RT DECK) | FAILS SHORT |
| 1007 | FUEL & OXIDIZER LOWER CENTER FEED LINE OVER TEMP | FAILS OPEN |
| 1008 | FUEL & OXIDIZER LOWER CENTER FEED LINE OVER TEMP | FAILS SHORT |
| 1010 | FUEL & OX LOWER CENTER XFEED LINE CONTROL TEMP | FAILS SHORT |
| 1011 | FUEL & OXIDIZER LOWER LEFT FEED LINE OVER TEMP | FAILS OPEN |
| 1012 | FUEL & OXIDIZER LOWER LEFT FEED LINE OVER TEMP | FAILS SHORT |
| 1015 | FUEL & OXIDIZER LOWER RIGHT FEED LINE OVER TEMP | FAILS OPEN |

| MDAC ID | ITEM | FAILURE MODE |
|---|---|---|
| 1016 | FUEL & OXIDIZER LOWER RIGHT FEED LINE OVER TEMP | FAILS SHORT |
| 1024 | FUEL HI PT BLEED LINE OVER TEMP | FAILS SHORT |
| 1026 | FUEL HI PT BLEED LINE T-4 UMB OVER TEMP | FAILS SHORT |
| 1030 | L FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP | FAILS SHORT |
| 1038 | OXIDIZER HI PT BLEED LINE OVER TEMP | FAILS SHORT |
| 1040 | OXIDIZER HI PT BLEED LINE T-4 UMB OVER TEMP | FAILS SHORT |
| 1044 | R FUEL & OXIDIZER LO PT BLEED LINE OVER TEMP | FAILS SHORT |